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Web based Direct Benefit Transfer Management Information System (MIS) at DARE-ICAR

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SUMMARY

Direct Benefit Transfer (DBT) is an initiative of Government of India (GoI) for transfer of benefits in all government schemes directly to the beneficiaries. In the Department of Agricultural Research and Education (DARE)-Indian Council of Agricultural Research (ICAR), a total of twenty (20) schemes are covered under DBT wherein the beneficiaries are the farmers, students and faculty members and the benefits type are both as cash and in kind. A web based Management Information System (MIS) (https://dbtdare.icar.gov.in) to manage the DBT records of beneficiary in different schemes of DARE-ICAR has been developed and hosted in the ICAR Data Centre at Indian Agricultural Statistics Research Institute (IASRI), New Delhi. This application is developed using .NET framework and uses web service for data exchange with national level DBT Bharat portal (https://dbtbharat.gov.in).

Keywords: DARE, DBT, ICAR, MIS, WebAPI.

1. INTRODUCTION

Direct Benefit Transfer (DBT) was started in 2013 in India as a major reform in the government delivery system by re-engineering the existing process in welfare schemes for simpler and faster flow of information/ funds to ensure accurate targeting of the beneficiaries and reducing duplication and fraud in government schemes. The DBT Mission under the Cabinet Secretariat, Government of India (GoI) is the nodal point for the implementation of the DBT programmes across all the ministries in the Government of India. Electronic Payment Framework was laid down for all Ministries/Departments and their attached Institutions/ Public Sector Undertakings (PSUs) and is applicable on all Central Sector (CS)/Centrally Sponsored Schemes (CSS) and for schemes where components of cash are transferred to individual beneficiaries. Since aadhaar number provides unique identity and is useful in targeting the intended beneficiaries, aadhaar is preferred and beneficiaries are encouraged to have aadhaar number. DBT is the high priority and focus area of the Government. A DBT Bharat portal (Direct Benefit Transfer Mission, Government of India 2020) was launched in 2016 as a platform for management of all DBT applicable scheme related information. The portal has information regarding the schemes, beneficiaries and fund transfer details. All the documents pertaining to the DBT are also available in this portal.

Over the last decade, there has been tremendous global attention on cash transfers from governments to citizens directly as a means of addressing poverty, inequality and other desirable policy goals. The attention was spurred by the success of large cash transfer programmes in the United States of America, which were found to be highly effective. There is evidence in some cases that cash transfer programmes were able to mitigate poverty, reduce inequality, improve school enrolment and increase women's access to health

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services. The success of such interventions especially in Brazil (through Bolsa Família programme launched in November, 2003) and Mexico led to numerous studies on cash transfer programmes in other parts of the world, making it one of the most studied forms of antipoverty interventions in the recent decades (The World Bank, 2014). The Brazilian government has also developed a portal viz. Portal da Transparência (Union General Controller, 2004) which is dedicated to making public all expenditures (including Bolsa Família) of the federal government. The portal was aimed to ensure the proper and correct application of public resources. It has a list of all expenses and money transfers the federal government has made, including the list of all people receiving Bolsa Família benefits and how much they have received.

In Indian context, various e-governance initiatives have been taken up in the field of agriculture both by ICAR and Department of Agriculture, Cooperation & Farmers Welfare. Krishi Vigyan Kendra (KVK) Knowledge Network (https://kvk.icar.gov.in), popularly known as KVK Portal (ICAR-IASRI 2016) helps in monitoring the functioning of KVKs at the National level and in providing timely information and advisory to the farmers. The aim of the portal is to transfer the technologies developed by the agricultural scientists to the farmers in a fast and effective manner using web and mobile technology (Pal et al. 2019) as well as to monitor the activities of KVKs. Farmers' Portal (https://farmer. gov.in) (Ministry of Agriculture and Farmers' Welfare, Government of India 2016) is designed to create one stop shop for meeting all informational needs relating to Agriculture, Animal Husbandry and Fisheries sectors production, sale/storage of an Indian farmer. Through this portal a farmer can get all relevant information on specific subjects around his village/block/district or state. This information is delivered in the form of text, SMS, email and audio/video in the language the farmer understands. Farmers can ask specific queries as well as give valuable feedback through the Feedback module specially developed for the purpose.

DARE-ICAR under the Ministry of Agriculture and Farmers Welfare coordinates and promotes agricultural research and education in the country. There are 20 different DBT applicable schemes which are presently running in Department of Agricultural Research and Education (DARE)-Indian Council of Agricultural Research (ICAR). The schemes include student centric

schemes. i.e. various scholarships and fellowships, faculty schemes and farmers centric schemes. Out of the total 20 schemes, 19 are related to agricultural education/ research wherein the benefit type is cash and in agriculture extension scheme, the benefit type is in kind. The schemes are monitored by the scheme managers and implemented in various ICAR institutes, agricultural universities and other organizations across the country (Table 1).

Each institution/agricultural university is required to provide the information with respect to the schemes being implemented at their organization. A Monthly Progress Report (MPR) of each scheme is submitted on DBT Bharat portal on a stipulated date every month. For management and reporting of scheme related information with respect to the beneficiary and transaction for all the twenty on boarded schemes of DARE-ICAR, a Management Information System (MIS) (https://dbtdare.icar.gov.in) is developed at the national level.

2. METHODOLOGY

2.1 Technology used in DBT DARE Management Information System (MIS)

The DBT DARE Management Information System (MIS) has been developed based on 3-Tier Architecture using the following technology

- a. ASP.NET framework 4.5
- b. SQL Server 2012 used for database
- c. Visual studio 2013 as Integrated Development Environment (IDE)

The 3-tier architecture which is a form of client-server architecture, has been used to develop the MIS in which the functional processes viz. logic, data access, data storage and user interface are maintained as independent modules on separate platforms. It provides many benefits for production and development environments by modularizing the user interface, business logic, and data storage. In the present system, there are three layers viz.,

a. Presentation layer: It is the front end layer in the 3-tier system and consists of the user interface. This layer is built on web technologies such as HTML5, JavaScript and CSS.

Table 1. Schemes of DARE-ICAR integrated with DBT Bharat Portal

S. No.	Scheme Code	Scheme Name	Benefit type	Scheme monitored by
1	A8A18	AgEdn - IASRI scholarship for MSc and PhD	Cash	Director, ICAR-IASRI, New Delhi
2	ASM63	AgEdn - ICAR Emeritus Professor	Cash	ADG, HRD, Ag. Education Division, ICAR, New Delhi
3	A8MN1	AgEdn - ICAR Emeritus Scientist	Cash	ADG, HRD, Ag. Education Division, ICAR, New Delhi
4	A4AF1	AgEdn - ICAR Junior Research Fellowship	Cash	ADG, HRD, Ag. Education Division, ICAR, New Delhi
5	AXDCI	AgEdn - ICAR National Professor and National Fellow	Cash	ADG, HRD, Ag. Education Division, ICAR, New Delhi
6	AB5OP	AgEdn - ICAR Senior Research Fellowship	Cash	ADG, HRD, Ag. Education Division, ICAR, New Delhi
7	AQ20K	AgEdn - India-Afghanistan Fellowship	Cash	Director, DARE & ADG, EQA&R, Ag. Education Division, ICAR, New Delhi
8	AR4YI	AgEdn - India-Africa Fellowship	Cash	Director, DARE & ADG, EQA&R, Ag. Education Division, ICAR, New Delhi
9	A7N6H	AgEdn - Merit Cum Means Scholarship	Cash	ADG, HRD, Ag. Education Division, ICAR, New Delhi
10	ALMOJ	AgEdn - National Talent Scholarship PG	Cash	ADG, EP&HS, Ag. Education Division, ICAR, New Delhi
11	AN084	AgEdn - National Talent Scholarship UG	Cash	ADG, EP&HS, Ag. Education Division, ICAR, New Delhi
12	A5IPK	AgEdn - Netaji Subhas ICAR International Fellowship	Cash	ADG, EQA&R, Ag. Education Division, ICAR
13	AY4IO	AgEdn - Post Matric Scholarship	Cash	ADG, HRD, Ag. Education Division, ICAR, New Delhi
14	AL11P	AgEdn - Student READY	Cash	ADG, EP&HS, Ag. Education Division, ICAR, New Delhi
15	AWU5S	Agriculture Extension	In Kind	DDG, Agri. Extension Division, ICAR, New Delhi
16	A73NS	AS_IVRI_Institute Scholarship for M.V.Sc. And Ph.D.	Cash	Director, ICAR-IVRI, Izatnagar
17	AMVTA	AS_NDRI_Institute Scholarship For MSc And PhD	Cash	Director, ICAR-NDRI, Karnal
18	AYTEW	CS- IARI Scholarship	Cash	Director, ICAR-IARI, New Delhi
19	ATUOB	FS - CIFE -Institutional Fellowship	Cash	Director, ICAR-CIFE, Mumbai
20	AR6F4	ICAR HQ NASF	Cash	ADG, NASF, ICAR, New Delhi

Table 2. Description of the database tables used in DBT DARE MIS

S.No.	Table Name	Description				
1.	dbt_BeneficiariesTransferDetails	Data on transactions made by the University/College/Institute against the beneficiaries				
2.	dbt_FinYear	List of financial years				
3.	dbt_general_information_form	Data on general information of the DBT Schemes				
4.	dbt_MasterBeneficiaries	Details of master beneficiaries added by the University/College/Institute				
5.	dbt_MPR_Report	Data on month wise and scheme wise transaction made by the University/College/Institute				
6.	Dbt_schemes	Dbt_schemes Data on all DBT schemes of DARE-ICAR along with their codes				
7.	dbt_state_code	Data on all state name along with their codes				
8.	Univ_Details	Details of the University/College/Institute				
9.	User_profile	Consisting of user credentials and other details of University/College/Institute				
10.	Dbt_training	Data on farmer wise training information				
11	Dbt_crop	Data on crop details used in Front Line Demonstration (FLD) and On Farm Trail (OFT)				
12.	Farmer_details	Data on general information like address, bank account details of farmers				
13.	Dbt_farmer	Data on farmer wise crop information				

- **b. Application layer:** This layer is consisting of the functional business logic which drives an application's core capabilities. It has been constructed using C# language.
- c. Data layer: This layer depicts the database/data storage system and data access layer. In the present system, Microsoft SQL Server 2012 is used. Table 2 depicts the name of the

database tables used in the present system along with their brief description. Fig. 1 shows the corresponding ER diagram of the database.

With the introduction of DBT DARE MIS, each university/institute can upload the information online. Their authentication is at first checked in the system followed by uploading of information on respective schemes. The entire process has many steps which are described below:

2.2 Beneficiaries information

For each of the organization, there exists a list of master beneficiaries which are maintained by that organization only. For students related schemes, there are two different excel templates for Indian and foreign students through which the beneficiary details can be uploaded in the system. For the schemes like ICAR Emeritus Scientist, ICAR Emeritus Professor, separate excel template has been developed to capture information on Professor/Scientist/National Fellow (Fig. 2). Sometimes, it may happen that a beneficiary has left the organization for example passed out student, retired professor etc. Therefore, a provision is there in the system to activate/deactivate individual beneficiary at any point of time by the respective organization.

2.3 Transaction Information

After uploading the information on individual beneficiary in the system, transaction details of individual beneficiary can be uploaded in the system on

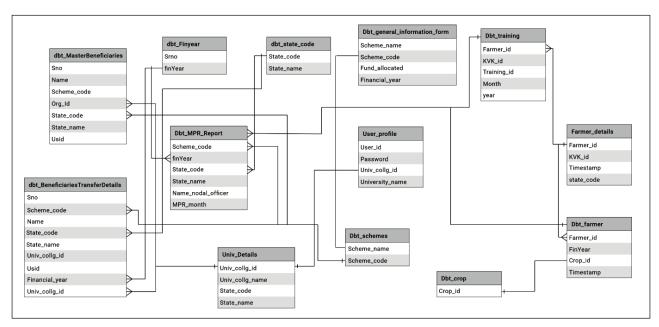


Fig. 1. ER Diagram of the DBT DARE MIS

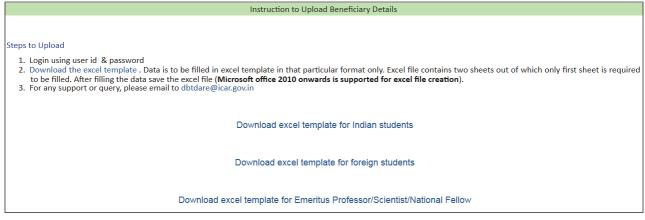


Fig. 2. Excel template for uploading of beneficiary data

monthly basis. There are two types of provision in the system to upload this information; transaction details can be filled individually as well as bulk transaction information can also be entered. Fig. 3 shows the bulk transaction uploaded under the scheme AgEdn – IASRI scholarship for MSc and PhD for the month of June in financial year 2018-19.

Out of total 20 schemes, data for 19 schemes are filled in DBT DARE MIS, however, for the Agriculture Extension scheme the data is transferred from the *Krishi Vigyan Kendra Knowledge Network Portal* (https://kvk.icar.gov.in). The individual KVK fills the data related to training, Front Line Demonstration (FLD) and On Farm Trial (OFT) in the KVK Portal. This information is collated in the ATARI (Agricultural Technology Application Research Institute) level and then at the Agriculture Extension Division, ICAR HQ level where the information is approved before its transfer to the DBT DARE MIS.

2.4 Monthly Progress Report (MPR)

The data uploaded by the stakeholders are summed scheme-wise in the system. This is the Monthly Progress Report (MPR) based on certain parameters viz. total number of beneficiaries (cumulative for the financial year), total number of transactions (monthly basis) and total fund transfer/expenditure (monthly basis). Thus, a total of twenty (20) MPRs are generated for all the schemes in the system automatically on monthly basis. This data under each scheme is approved by the DBT Cell (DARE-ICAR) every month before it is transferred to the DBT Bharat portal. Fig. 4 shows the MPR data approval page for the scheme FS – CIFE – Institutional Fellowship for the financial year 2018-19. 'View Data' is appeared for the months against which the MPR have already been approved whereas 'Approve Data' is appeared for the month for which the MPR data has still not approved.

The monthly progress report information is pulled by DBT Mission of India (https://dbtbharat.gov.in/)

	Upload Bulk Transaction												
			ian Agricultural St - IASRI scholarship			tute,Delhi Financi Month	al Year : 2018-19 : June						
Select All	S No	USID	Name	Date of Birth	Gender	Address	Bank Account No	IFSC Code	Transfer Amount	Mode of Transaction	Transaction Date YYYY/MM/DD	From Month	To Month
S	1	U-17-DL-01- 001-D-A-035	Dipankar Mitra		Male	Section Co. Co. Co. Co.		_	12000	NEF⁻ ▼	2018-06-06	<i>↓</i> ▼	<i>F</i> •
	2	U-17-DL-01- 001-D-A-036	Akhilesh Jha		Male	E-SH Saler Regar Series BYS		11600010	0.00	NEF ▼		- •	- •
v	3	U-17-DL-01- 001-D-A-038	Md. Yeasin		Male	Page March Technol			12000	NEF ▼	2018-06-06	<i>I</i> •	<i>‡</i> •
	4	U-17-DL-01- 001-D-A-037	Ashis Ranjan Udgata		Male	Barriotico S.F. Por Agarqueto		11600010	0.00	NEF ▼		- •	- •
Ø	5	U-17-DL-01- 001-D-A-033	Ronit Jaiswal		Male	because the later facts			12000	NEF ▼	2018-06-06	<i> </i>	<i>↓</i> ▼
	6	U-17-DL-01- 001-D-A-034	Samir Barman	277	Male	Robert FO & Robert Street	-	1-10-11	0.00	NEF 🔻		- •	- 7

Fig. 3. Uploading of bulk transaction data

Scheme Name :			FS - CIFE - Institutional Fellowship						
Ministry Name :			Department of A	gricultural Research and Edu	cation	Scheme Code : ATUOB			
Scheme Type :			Central Sector S	cheme		Type of transfer (Cash/In Kind/Cash & In Kind) : Cash			
Financial Yea	Financial Year : 2018-19		2018-19 🔻						
	Month Total No			s(Cumulative for the Total No. of Transactions(Monthly basis)		Total Fund Transfer/Expenditure(Monthly basis)	Action		
	January	258		258	1	2307079.00	View Data		
	February	259		259	2	2393869.00	View Data		
	March	259		259	9	3418785.00	Approve Data		

Fig. 4. Approval of MPR data

on a prefixed date and time to update the same in the national level DBT Bharat Portal. This data pulling is done by a scheduler through web service. The data exchange between two portals is done through Web Application Programming Interface (WebAPI) (Block et al., 2014). In the present scenario, Representational State Transfer (REST) APIs (Kurtz and Wortman, 2014) have been used for sharing of data. In DBT DARE MIS, the WebAPIs have been developed using ASP. NET framework 4.5 Model-View-Controller (MVC) model. The output of the API can be in JavaScript Object Notation (JSON) or Extensible Markup Language (XML) format as per need of the client. In the present system, XML output format is used. To get the ouput in XML the data needs to be serialised, therefore, XmlSerializer class is used (Bornstein, 2004) for data exchange in the present MIS. This serialization technique turns the data in the application into XML that is transmitted between clients and services. Fig. 5 shows the architecture of API used in DBT DARE MIS.

3. RESULTS AND DISCUSSION

As per the requirement of the DBT Mission and the concerned ministry, several reporting formats have been developed in the DBT DARE MIS.

3.1 DBT scheme reporting module

A number of reports formats have been developed

in the MIS both for the individual organizations and the scheme managers for monitoring of the information in the system.

3.1.1 Reports for organization

For individual organization, there are 2 reports available in the MIS:

- i) Beneficiary report (Fig. 6) and
- ii) Transaction report (Fig. 7).

In the beneficiary report, individual organization can select a particular scheme to view the beneficiary details data that has been already uploaded in the online system against that scheme. Fig. 6 depicts the report of beneficiaries under the IASRI scholarship scheme. Whereas, in the transaction report, individual organization can view transaction details of a scheme which has been uploaded in the online system in a particular month of a financial year. Fig. 7 shows the transaction report under the same scheme for the month of February in financial year 2018-19.

3.1.2 Reports for managers:

Managers are facilitated with a dashboard which reflects the data uploading status of a particular scheme for a given period. Fig. 8 shows the dashboard consisting of number of beneficiaries and amount of transactions under different schemes.

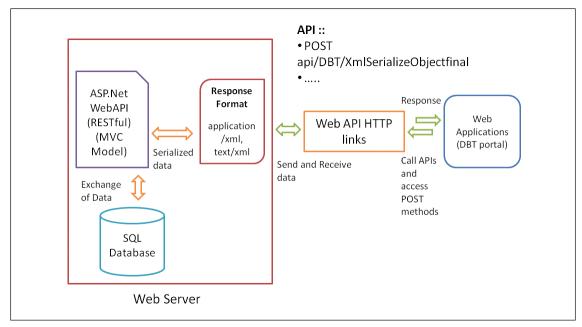


Fig. 5. DBT DARE WebAPI Architectural diagram

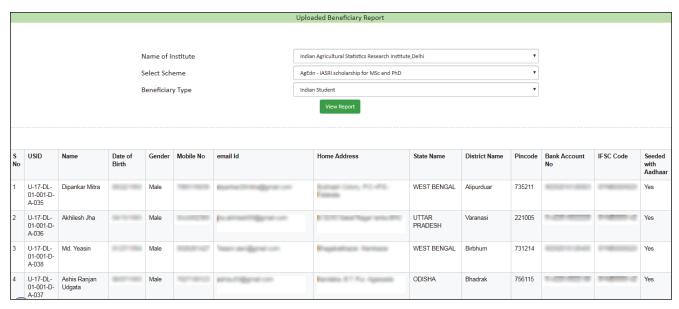


Fig. 6. Beneficiary report

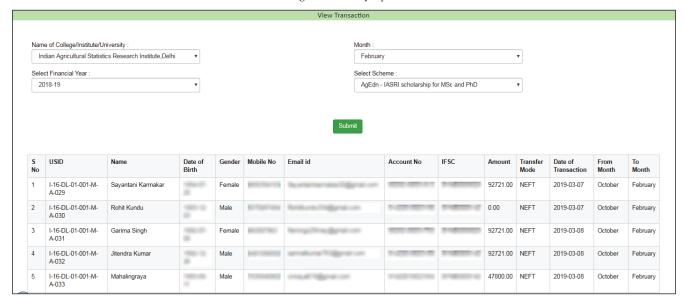


Fig. 7. Transaction report

In addition to this, an overall scheme wise report for the financial year has also been provided. This report can be viewed for all the months (in a financial year) or for a particular month. The scheme wise report can be drilled down further to college wise (student scholarship related schemes) for a particular university. Fig. 9 shows the college wise beneficiary and transaction details of Navsari Agricultural University under National Talent Scholarship PG scheme uploaded so far in the MIS for the financial year 2019-20.

4. CONCLUSION

DBT DARE Management Information System has been developed and integrated with the DBT Bharat Portal through web service. All the 20 DBT applicable schemes of DARE-ICAR identified have been onboarded on DBT Bharat Portal and are required to upload MPR through DBT DARE MIS. This system will considerably save time, energy and money through transaction costs reduction and acquire the information in a cost effective manner. It also provides the detailed

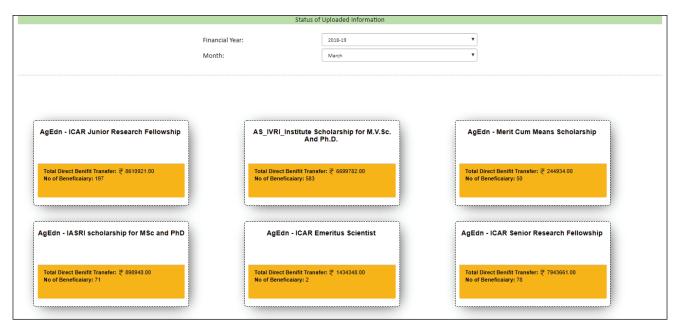


Fig. 8. Dashboard for data monitoring

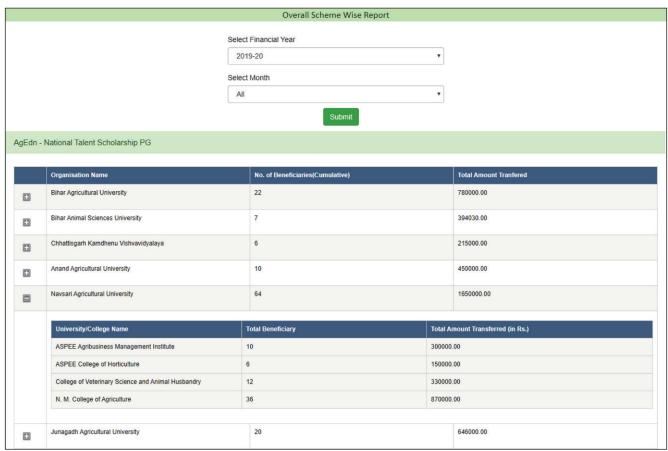


Fig. 9. Overall scheme wise report

information at one place under different DBT schemes of DARE-ICAR.

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REFERENCES

- Block, G. *et al.* (2014). Designing Evolvable Web APIs with ASP.NET: Harnessing the Power of the Web. California, USA: O'Reilly Media, Inc.
- Bornstein, N.M. (2004). Net and XML. California, USA: O'Reilly and Associates.
- Department of Agriculture, Cooperation & Farmers' Welfare, Ministry of Agriculture and Farmers' Welfare, Government of India. 2016. Farmers' Portal. Retrieved from https://farmer.gov.in.
- Direct Benefit Transfer Mission, Government of India (2020). Direct Benefit Transfer. Retrieved from https://dbtbharat.gov.in.
- ICAR-IASRI (2016). Krishi Vigyan Kendra Knowledge Network. Retrieved from https://kvk.icar.gov.in.
- Kurtz, J., and Wortman, B. (2014). ASP.NET Web API 2: Building a REST Service from Start to Finish (2nd ed.). New York, USA: Apress.
- Pal, S., Marwaha, S., Arora, A., Choubey, A. K., Singh, A. K. Poswal, R. S., Adhiguru, P., Islam, S. N., Kumar, H., Gupta, C. and Kumar, S. (2019). KVK Mobile App: An ICT tool to empower farmers, *Ind. J. Agril. Sci.*, 89(8), 1362-5.
- The World Bank. (2014). https://www.worldbank.org/en/news/feature/2014/03/22/mundo-sin-pobreza-leccion-brasil-mundo-bolsa-familia (accessed on 16th July, 2019).
- Union General Controller. (2004). http://www.transparencia.gov.br (accessed on 16th July, 2019).

Krishi Vigyan Kendra (KVK): KVKs are established for conduct of location specific on-farm trials and frontline demonstration for newly released varieties/technologies in farmers' field under different farming systems in Indian context. They are hosted under different organizations viz. ICAR Institute, State Agricultural University, Central Agricultural University, Non-government Organization, State Government, Central University, Deemed University, PSU and other Educational Institution. As of now, there are 716 KVKs in the country.

Source: https://icar.org.in/content/agricultural_extension division

Aadhar: Aadhaar number is a 12-digit random number issued by the Unique Identification Authority of India (UIDAI) to the residents of India after satisfying the verification process laid down by the Authority. This number is unique and robust enough to eliminate duplicates and fake identities and may be used as a basis/primary identifier to roll out several Government welfare schemes and programmes for effective service delivery thereby promoting transparency and good governance. The Aadhaar identity platform is one of the key pillars of the 'Digital India', wherein every resident of the country is provided with a unique identity.

Source: https://uidai.gov.in