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DEPARTMENT OF
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सत्यमेव जयते

Viksit Bharat-
Secure and Sustainable
e-Service Delivery

COMPENDIUM

of e-Governance Initiatives 2024

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CHAPTER 1

Transforming Agriculture through AgriStack:
Sustainable e-Service Delivery for Bharat

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Abstract:

This paper delves into the transformative role of the AgriStack project in revolutionizing e-governance in agriculture and service delivery. It explores the project's innovative approach to utilize an inclusive digital ecosystem for agriculture to address challenges faced by farmers with regard to access to formal credit, agricultural inputs, markets, farm advisories, and the significant contributions it makes to the agricultural sector with resource management, streamlining services leading to achievement of Sustainable Development Goals and modernization of Indian agriculture in a sustainable manner.

Keywords: Agri Stack, Digital Agriculture, e-Governance, Farmer Registry, Sustainable Agriculture, interoperability

Introduction:

India's digital revolution has transformed governance and service delivery through the creation of digital public infrastructure. Some examples include Aadhar, which is a Unique Identi?cation Number that is linked to the individual's biometric readings; Digi Locker for storing an individual's data securely; eSign, which lets individuals electronically sign contracts and eliminates the need for physical documents; eKYC facility for instant veri?cation of an individual; Aadhar-enabled Payment Bridge and Uni?ed Payments service (UPI) for trustful digital payments; Electronic Health Records (EHR); Digital Infrastructure for Knowledge Sharing (DIKSHA), etc. These initiatives leverage Information and Communication Technologies (ICTs) to develop digital rails for a seamless ?ow of

information, value creation, transformation in e-governance, and service delivery across various sectors.

The government announced the building of Digital Public Infrastructure for agriculture in the Union Budget 2023-24 with a novel objective of promoting digital identi?cation, data protocols, standardization and data federalism in the agriculture sector. This marks a signi?cant leap in reimagining e-governance in agriculture, characterized by decentralization, user-centric design, security, and user data control within a distributed, open digital ecosystem.

Unlike platform-centric approaches of the past, Agri Stack follows a protocol-based approach, ensuring modularity, elasticity and adaptability to the evolving needs of the agricultural sector. By leveraging trustful data on farmers, farmlands and crops and the use of modern digital technologies, such as data analytics and arti?cial intelligence, AgriStack aims to make service delivery mechanisms more e?cient and transparent in the interest of farmers. With AgriStack in place, Shanti, a women farmer, would be able to digitally identify and authenticate herself to access bene?ts and services, obviating cumbersome paperwork and with little or no need to physically visit various o?ces or service providers. Some examples include availing Government schemes and crop loans, connecting to agri-input suppliers and buyers of agricultural produce, accessing personalized advisories in real time, etc. The standardized data would also help Government agencies make schemes and services more e?cient and transparent, such as paperless MSP-based procurement and crop insurance, and develop systems for balanced fertilizer use, etc. Further, the digitally captured crop-sown data will help in accurate crop area estimation and crop diversi?cation. AgriStack will also enable the stakeholders in the agriculture ecosystem to establish e?cient value chains for agricultural inputs and post-harvest processes.

Agri Stack as a Digital Public Infrastructure:

Agri Stack is a collaborative project between the Central and State Governments, serving as a comprehensive Digital Public Infrastructure. It utilizes open-source, open-APIs, and interoperable building blocks to provide digitally authenticated identities to farmers, such as Farmer IDs, digital assets such as Farm IDs and Crop Sown certi?cates to enable secure, consent-based digital transactions in a federated architecture where States curate and maintain data with the support of Government of India.

Figure 1:Key Building Blocks for Inclusive Digital Agriculture Ecosystem

AgriStack integrates technology, markets, and governance to create an inclusive, integrated digital agricultural ecosystem. The Agri Stack comprises various building blocks, which are essential components supporting the functionality, data sharing, innovation and security within the AgriStack architecture:

1. **Unified Farmer Service Interface (UFSI):** UFSI is a gateway facilitating diverse agricultural services with centrally defined data schema, with a set of standard APIs. It enables seamless communication and flow of information between various components of AgriStack and IT systems within the agriculture ecosystem. The interoperability and data flow across different platforms enable unified, integrated and standardized data access to stakeholders, be it private or public. In terms of the flow of data and information, UFSI is similar to UPI. UPI facilitate the flow of information between banks with different Core Banking Solutions (CBS). Similarly, UFSI facilitates the flow of information between Govt. schemes and various State Governments. While each stakeholder may have their own set of standards, the exchange of information through UPI or UFSI is through standardized APIs, as shown in the Figure below:

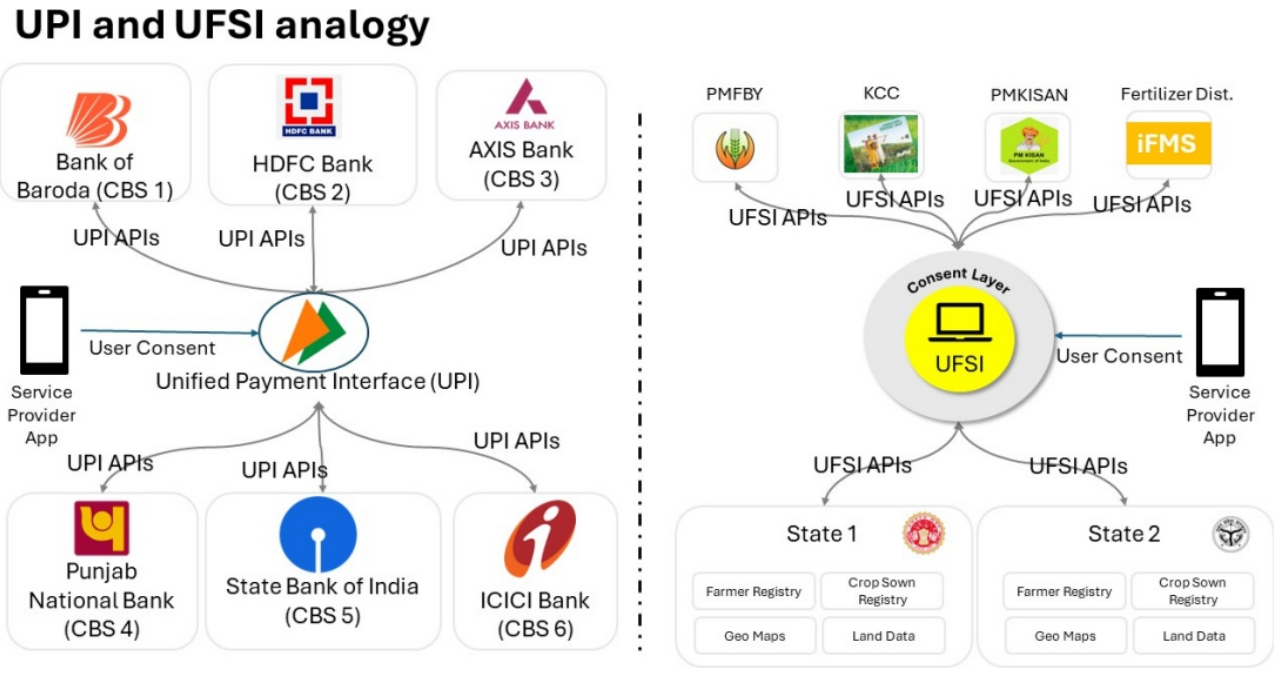

Figure 2: Similarity in the flow of information between UFSI and UPI

2. **Consent Manager:** The Consent Manager facilitates secure and authorized data sharing with the explicit consent of the Data Principal, i.e., the farmer, in compliance with the Digital Personal Data Protection Act, 2023. It upholds the privacy and data protection principles, giving farmers granular control over their data, as farmers are given the ability to grant or revoke consent for partial or complete data sharing.

3. **The Core Registries in AgriStack:**

   a. **Farmers Registry:** Implemented and maintained by the States, it is a registry that integrates various databases after standardization and verification of State Farmer Databases to create State Farmer Registries. These Registries, established by the respective State Governments, ensure accurate and dynamically updated farmland ownership, establishing a unique record of land-owning farmers. The registries facilitate the issuance of unique Farmer IDs linked to Aadhaar, ensuring efficient delivery of agricultural services and schemes to farmers.

   b. **Geo-Referenced Village Maps:** Georeferenced Village Maps are essential for the Agri Stack, a critical component for agricultural planning, crop surveys, and advisory services. The process of georeferencing involves scanning paper maps, vectorizing them to compute boundary geometries, and assigning precise geographical coordinates (latitude and longitude) to all vertices. While detailed georeferencing at the Survey Number or sub-survey

Number level is ideal, village-level georeferencing suffices for immediate needs like digital crop surveys. This approach allows the mapping of farmer's land and crop details using geotagged photos from a mobile app, ensuring genuine field visits and traceability of data discrepancies, if any.

c. **Crop Sown Registry:** Enabled through the Digital Crop Survey (DCS), it integrates RoR data and geo-referenced map data. State governments conduct DCS using village-level assistants, residents, and farmers as surveyors and verifiers, ensuring authenticated and verified data collection for the database of crops grown by farmers at the State level every cropping season. DCS enables the obtaining of plot-level crop-grown data for every season with physical inspection and geotagged photographs. The ground truth data serves as a rich repository useful for satellite-based crop signature identification and algorithm training. Other use cases, such as crop area estimation, crop diversification and planning, crop insurance and MSP procurement, can be conducted by leveraging DCS data.

4. **Support Registries:** Besides the three core registries, 25 Support Registries and Master Datasets have been identified to standardize agricultural data nationwide and will be created by the Centre with the participation of the States. Examples include Crop Registry, Seed Registry, Pesticide Registry, etc. Each registry aims to streamline and bring consistency to agricultural data, fostering interoperability across states and private sector actors with regard to such master data sets. So far, 12 Support Registries have been created and published for public use.

Current Status: At present, 14 States and UTs have signed MoUs with the Government of India, while many more are getting ready to implement the digital public infrastructure for agriculture. The Farmer Registry's proof of concept has been conducted in one district in each of the 6 States. Further, the Farmer Registry is under implementation in 11 States. As per a recent order by the Dept. of Agriculture and Farmers Welfare, the State Farmer Registry and a unique Farmer ID shall be an essential prerequisite for availing PM KISAN benefits. Hence, all States have to implement a State Farmer Registry within a stipulated timeline.

Efforts are underway to digitize and georeference hand-drawn cadastral maps, mapping land parcels to village boundaries. Around 3,63,685 villages (56%) have been georeferenced till date, with active efforts underway for the rest of the villages across various States. In terms of state-wise completion, 15 States have completed georeferencing, while 14 other States are in the near-completion stage.

The pilots for the Digital Crop Survey (DCS) were conducted in Kharif and Rabi in 2023 in 12 States. Since then, More States have been onboarded. From Kharif 2024, DCS will be implemented in 19

States and UTs covering over 80% of the country's farmlands. States are also implementing the Centre-State sync to share the aggregate crop-sown data captured in DCS with the Centre. In fact, DCS has captured more than 7.5 Crore photos to date, which will be useful as ground- truthed data for spectral signature and satellite imaging of crops.

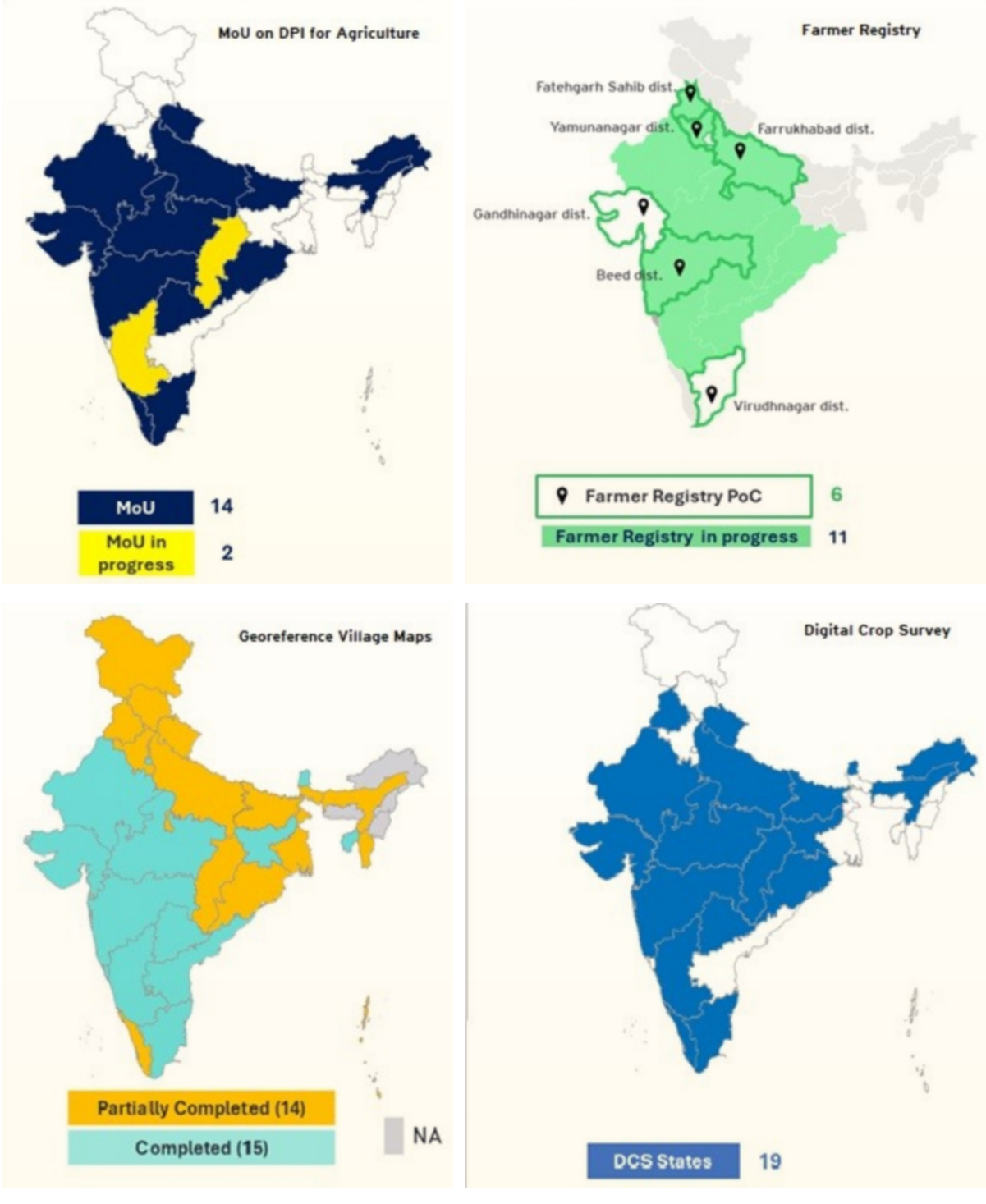

Figure 3: Progress on MoU, Core Registries of Agri Stack among States

Agri Stack for e-Governance in Agriculture:

The Government of India and State Governments have implemented various governance schemes and initiatives using ICTs to support farmers and improve their livelihoods. These schemes and initiatives aim to uplift Indian farmers through financial assistance, improve access to markets, enhance agricultural productivity, and reduce the risk associated with farming.

AgriStack's integration with these schemes shall transform governance and service delivery regarding agricultural credit, farm inputs, access to market, crop insurance, customized crop advisory, etc. Agri Stack has prioritized digital solutions, such as access to finance (with the integration of JanSamarth/RBI Innovation Hub, etc.), crop estimation (with the integration of crop sown data through DCS), Minimum Support Price, crop insurance (under PMFBY scheme), etc.

The integration of Agri Stack with JanSamarth has enabled farmers to avail short- term formal credit within 30 minutes in a paperless, presence-less manner using Agri Stack compared to the previous process, which took 15-20 days. This is achieved by enabling the government system to fill out the KCC application using the Farmer ID automatically. Also, farmers need to submit fewer or no documents, which makes the application process simple and convenient.

Combining the power of Agri Stack & Open Network for Digital Commerce (ONDC) can enable vendor discovery and disintermediation to facilitate access to a larger agricultural market for the farmer. By consuming AgriStack data on protocols such as the ONDC, farmers, service providers, and input companies can authenticate themselves, thereby promoting transparency and fair pricing in the agricultural supply chain. Farmers will be able to discover various e-commerce and transportation service providers, compare their offerings, and negotiate the best prices for their services. Additionally, service providers can utilize the registries within Agri Stack to directly connect farmers and Farmer Producer Organizations (FPOs) with input suppliers. This direct connection has the potential to make inputs more affordable for small-scale farmers, effectively addressing the challenge of affordability.

Similarly, other scheme-based IT systems can be developed by the Central or State Governments for the effective implementation, management and/or monitoring of various Government Schemes pertaining to the agricultural value chain. These systems are typically in the form of Application Systems, Management Information Systems, disbursal systems etc. The Departments/Ministries can consume UFSI APIs to get data from the State AgriStack registries for their schemes and governance frameworks.

Table 1: Some potential uses of Agri Stack for e-Governance

Autofill of Application Forms	Data requirement for scheme monitoring, reporting and dashboarding	Cross-data analysis with other agricultural datasets
Authentication of Farmer, their land, or the crop they have sown.	GIS Visualizations	Access to 'Other support Registries/Master Databases' in Agri Stack
Consume/Verify Digitally Verifiable Credential of farmers for various services and benefits	Data for research and development, sectoral monitoring and planning purposes	

The emergence of technologies such as Arti?cial Intelligence (AI) presents an opportunity to develop and disseminate customized and personalized advisory solutions to farmers on a large scale. By analyzing data related to weather patterns, soil fertility, soil moisture, and crop growth, AI algorithms can be trained to predict potential issues and provide proactive decision support to farmers. The datasets pertaining to crop sown registry, georeferenced land records with acreage and geo-location, hyperlocal weather and market prices serve as the foundation for developing personalized and hyperlocal services and alerts to meet speci?c farm requirements or mitigate agricultural risks. The Agri Stack data sharing policy will enable data seekers with easy and cheaper access to high-quality, relevant data sets that otherwise were unavailable.

Comprehensive Ecosystem for Agri market and finance:

AgriStack-DPIs' transformative potential will be evident in cross-sectors as AgriStack integrates with ONDC and OCEN to enable a comprehensive ecosystem for markets and ?nance, as shown in Figure 4 below, thus promoting e?ciency, inclusion, and transparency.

The Government Platforms such as eNAM, Agri Data Exchange (powered by Agri Stack) and Agri Finance market shall serve as hubs for various agricultural activities, including trading, agricultural data sharing and ?nancial transactions. These platforms are to be integrated with ONDC and OCEN for digital commerce and credit enablement. The integration ensures connectivity and interoperability between di?erent stakeholders within the agricultural ecosystem, including commodity traders, logistic managers, quality assayers, etc. These applications utilize open protocols provided by ONDC and OCEN for connectivity and data exchange to cater to the needs of

the farmers, traders and processors who are on the receiving end of the DPIs. The end-user applications facilitate crop marketing, supply chain management, crop advisory, collateral-based lending, etc. Enabled by ONDC, the network of processors, buyers and private service providers is integrated, while OCEN enables the inclusion of lenders who interact with borrowers to provide quick and hassle-free loans. Thus, DPIs such as ONDC and OCEN, in conjunction with Agri Stack and government initiatives, private sector participation can establish an ecosystem that enhances market e?ciency and promotes financial inclusion with trust and transparency.

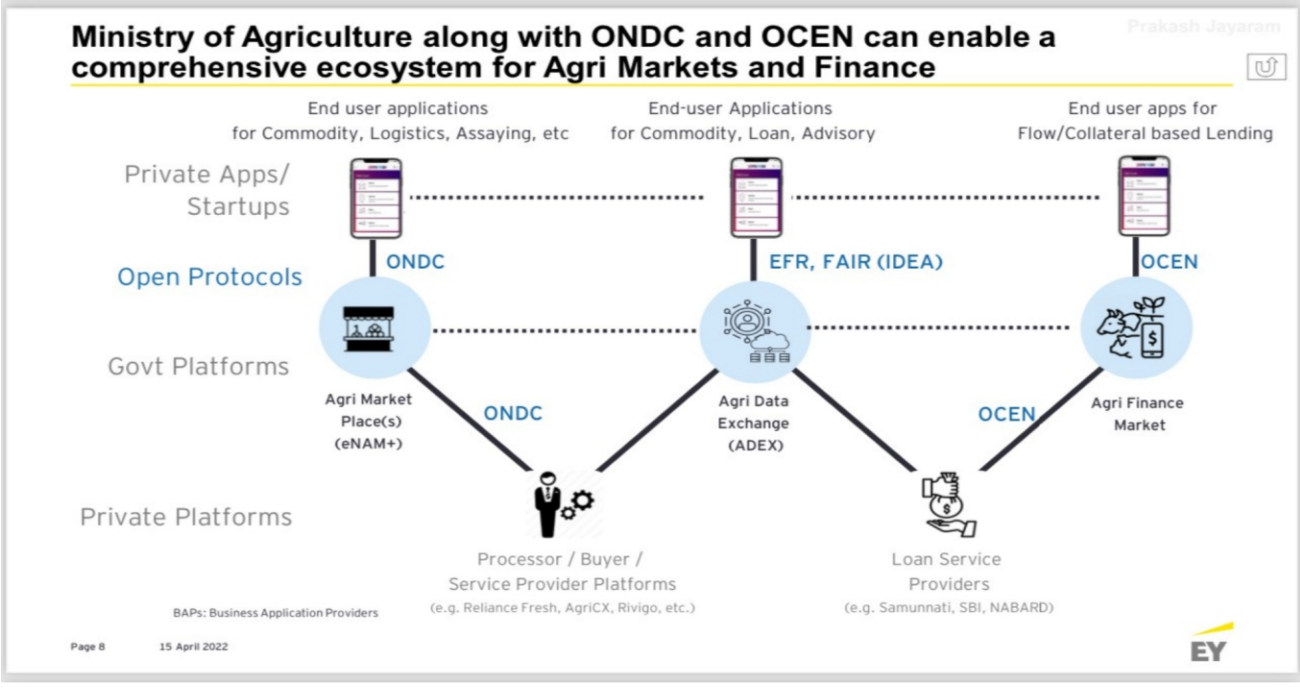

Figure 4:Agri Stack, ONDC and OCEN integration

Impact of Agri Stack:

Agri Stack has the capability to transform Indian agriculture through ecosystem thinking. AgriStack intends to solve the domain-speci?c challenges that exist in the agriculture sector, such as those pertaining to data interoperability, delivery of farmer-centric services, and transparency in the supply chain, market linkages, policy support, and governance.

1. **Immediate Impact:** In the case of Uttar Pradesh, with the help of a Digital Crop survey (DCS), more than 150 crops have been identified which were previously not found to be grown in the States. In Uttar Pradesh, using the Digital Crop Survey, the state administration saw an increased land area of 3.19 lakh hectares, which had stayed unreported in the traditional/manual way of recording crop sown (Girdawari). There are

150 more crops sown, which were recorded for the first time in digital crop surveys, including millets such as Kakun and Kodo.

Kisan Credit Card (KCC) loans are collateral-free loans given to eligible land- owning farmers to support the purchase of inputs in a cropping season. The dependence on bank functionaries and the requirement of paperwork makes it hugely cumbersome for farmers to get these loans. For a loan of Rs 1.60,000, it usually takes a minimum of 20 days and an expenditure of around Rs.10,000 by a bank and farmer. In a pilot conducted in the Farrukhabad district of Uttar Pradesh and Beed district of Maharashtra using AgriStack for veri?cation and validation of Farmer, crop and land, this disbursement of contactless paperless loan was completed in 15-30 minutes without any hassle.

Crop production estimates based on traditional methods will become more accurate and can be near real-time, impacting national statistics and measurements of Agricultural outputs. This would result in more accurate and timely estimates of GSDP and GDP.

AgriStack would address the issues around accuracy and e?ciency in data management and implementation of schemes both at the Central and State levels that handle big data and receive high budgetary support. For example, PM KISAN disburses bene?ts to around 9.30 crore farmers. Similarly, under the Crop Insurance Programme (PMFBY), claims of around Rs 1.5 lakh crores were received in the last 8 years from 23.2 crore farmers. Annual losses owing to pest attacks and diseases are estimated close to Rs 90,000 Crores. The Indian seed market is estimated to be around Rs 10,000 Crore, which relies heavily on farmer information for outreach and delivery. The availability of data on farmers, farmlands and crops sown for such schemes would lead to much- needed saturation and transparency in implementation.

2. **Impact of achieving Sustainable Development Goals (SDGs) -**Agri Stack helps meet 11/17 SDG goals as explained below-

Table 2: Impact of AgriStack on SDGs

SDGs	Impact of AgriStack
	Agri Stack enhances financial inclusion and income improvement by providing tailored credit, insurance, and subsidy programs, augmenting efforts towards doubling farmers income.
	AgriStack employs IoT and AI to offer real-time insights on soil health and pest management, doubling the productivity and incomes of small-scale producers, especially women and indigenous farmers, while promoting sustainable practices.

SDGs	Impact of AgriStack
	With AgriStack, women participation can be ensured with secured land rights and titles for women, empowering them in agricultural decision-making
	AgriStack optimizes irrigation practices and enhances water use efficiency, supporting integrated water resource management and local community participation
	AgriStack promotes energy conservation through solar- powered irrigation and efficient farming techniques, converting agricultural waste to sources of energy.
	It can drive job creation and skill development by providing access to training on advanced farming techniques and digital tools.
	Agri Stack strengthens digital infrastructure and stimulates innovation, fostering sustainable industrial processes for agricultural mechanization and development
	It ensures equitable resource distribution and financial service access, promoting income growth for the bottom 40%.
	AgriStack's traceability features ensure sustainable sourcing, enhancing consumer trust in the agri supply chain

SDGs	Impact of AgriStack
	Platform integrates climate-resilient farming practices and early warning systems, improving farmers' climate resilience and disaster management.
	AgriStack promotes sustainable land use and combats desertification, helping restore degraded lands and improve soil health. Through these multifaceted initiatives, Agri Stack ensures sustainable agricultural development, driving progress towards critical SDGs.

3. **Environmental Impact—India's Agriculture contributes 14% of the total greenhouse gas (GHGs) emissions. According to UNFCCC submissions, 54.6% of these GHG emissions stem from enteric fermentation (the digestive process of livestock), followed by 17.5% from rice cultivation and 19.1%** from fertiliser applied to agricultural soils [1]. With the help of data-driven insights, the environmental impact of agriculture can be reduced in a sustainable manner.

   The data available under AgriStack, together with soil health data, can enable tailored advisories to farmers for optimizing fertilizer use, thereby minimizing the quantity of fertilizer needed and thus reducing greenhouse emissions from rice cultivation, crop and manure management. Similarly, by leveraging precise data under AgriStack, farmers can enhance resource use efficiency, leading to a significant reduction in food wastage and post- harvest losses and reducing GHG emissions. Further, the implementation of precise agricultural techniques and sustainable farming practices will enable soil health conservation and biodiversity. The data-driven approach not only mitigates environmental impact but also supports farmers in achieving higher productivity and profitability, contributing to a sustainable and resilient agriculture sector.

4. **Integration with Emerging Technologies:** Emerging technologies such as drones, IoT, computer vision, and Artificial Intelligence will play a pivotal role in agricultural transformation. For personalized agricultural services, AgriStack will leverage real-time data from IoT sensors and drones to provide tailored crop and pest management advisories and improve outcomes such as improved crop health assessment. Precision farming techniques will be enhanced using AI algorithms, optimizing resource use and increasing productivity along with the establishment of a One-Nation-One-Soil system and integration of AgriStack.

Computer vision and AI using Agri stack data can provide farmers with real- time market trends and price discovery mechanisms, empowering them to make informed selling decisions and connect directly with buyers. For supply chain management, AgriStack will implement traceability features using IoT devices and computer vision to track the journey of agricultural produce from farm to fork.

Policymakers will benefit from insights derived from aggregated data within AgriStack along with emerging digital technologies to create targeted agricultural policies and assess their impact effectively. Capacity building and training will be strengthened through AgriStack by providing resources to enhance digital literacy among farmers, leveraging Large Language Models for agricultural extension services, including online courses and webinars. Sustainable agricultural practices will be promoted by providing data on soil health, water usage, and crop rotation, with drones and IoT sensors monitoring and mitigating environmental impacts through data analytics. Integration with other e-governance initiatives will create a unified digital ecosystem, facilitating cross-sector collaboration among government departments and stakeholders using Agri Stack as a common platform.

Conclusion and Way Forward:

In the evolution of agricultural governance and last-mile service delivery, Agri Stack will address critical challenges and empower farmers with the tools and services that were previously inaccessible. Contemporary issues such as disaster preparedness, gender inclusivity, and climate change resilience can be effectively managed through AgriStack's robust digital framework. The user-centricity, design and security and a federated architecture exemplify a forward-thinking approach to e-governance. Its integration with various Government schemes and emerging technologies can significantly impact the achievement of SDGs which underscores its importance not just for India but as a model for global agricultural development. The initiative's success hinges on continued collaboration between the government, farming communities and the private sector.

DPI, characterized by 3 fundamental pillars, i.e., common design, robust governance, and Stakeholder involvement, fosters trust, transparency, and accountability. Moving forward, as India develops and expands its capabilities in digital agriculture, the focus should be on removing the digital divide and promoting digital literacy among all farmers, including small and medium farmers, women farmers, landless farmers, and sharecroppers, so that they can easily access the services enabled by AgriStack. Additionally, scalability and sustainability need to be prioritized to accommodate the agriculture sector's growth. By sharing its learnings and experiences, India can lead the way in establishing global standards for digital agricultural infrastructure, benefiting farmers worldwide.

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CHAPTER 2

Digital Platform and Data Governance portal for Regulated Entities of Reserve Bank of India Implementation of Automated Data Collection, Quality Validations and Analytics (Regtech and Suptech)

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Abstract:

Reserve Bank of India (RBI) collects huge variety and volume of data from about 11,000 regulated entities. These data are used for various functionalities of the full-service central banking including banking regulation and supervision. RBI implemented multiple public digital infrastructures especially in the domain of payment systems. Recently, RBI implemented Centralised Information Management System (CIMS) which is built on a state-of-the-art big-data technology with integrated data governance capabilities for data collection, processing, validations, standardization, dissemination, analytics, and data protection. The system is designed with multiple Internet based web-portals which are accessed by thousands of users across the country. The dynamic and flexible user management module of CIMS provides facility to create and maintain customized role-based users by regulated entities and various departments of RBI with proper audit trails. Multiple data collection channels are implemented with special focus to major banks for on-boarding with safe and secure system-to-system automated data collection. System driven data collection monitoring and data quality measure implemented through a portal which provides automated alerts and error logs. Statistical Data and Metadata eXchange (SDMX) which is an international standard has been implemented for metadata and data lifecycle management. A Data Query engine implemented for building customized data extraction and visualisation.

Keywords: CIMS, Data Governance, SDMX, ADF

Introduction:

E/Digital governance have become critical components of modernizing public services. Central banks, as key players in financial systems, are actively adapting to technological advancements. E-governance involves using information and communication technologies (ICT) to improve the activities of public sector organizations. The components of e-Governance are as follows:

- **Digital Infrastructure:** Building robust ICT infrastructure to support electronic transactions, data submission and communication.
- **Regulatory Framework:** Establishing regulations and guidelines to govern digital interactions and transactions.
- **Cybersecurity and Data Security:** Implementing advanced cybersecurity measures to protect against digital threats. Implementing stringent security measures to protect sensitive financial data.
- **Public Services:** Offering digital platforms for public services such as electronic payments, online banking, electronic data submission and data governance.
- **Interoperability:** Ensuring seamless integration and communication between various financial systems and institutions.
- **Digital Currency:** Exploring and potentially issuing central bank digital currencies (CBDCs) as a means to modernize the financial system.
- **Artificial Intelligence (AI):** Leveraging AI for data analysis, fraud detection, and predictive modeling.
- **Big Data Analytics:** Employing big data to gain insights into economic trends and inform policy decisions.

Central banks utilize e-governance to enhance the efficiency, transparency, and reliability of their operations. Digital governance, on the other hand, goes beyond e-governance by encompassing the broader use of digital technologies to transform the way institutions operate and deliver services. For central banks, digital governance involves the integration of digital tools and technologies into their core functions, such as monetary policy, financial supervision, and currency issuance. This paper explains about implementation of E/Digital governance by Reserve Bank of India (RBI) relating to information management.

RBI implemented Data Warehouse (DW) during 2003 and lot of data from various sector of economy were integrated over last two decades. It disseminates about 60,000 data series on various macro-economic indicators through public portal known as Database of Indian Economy (DBIE). There are 30 departments working in various areas of central banking requires access to data for analysis and data driven policy making. The data requirements had exploded, and traditional databases were not capable of managing high volume of data. Also, demand of collection of unstructured data and text analysis requires big-data technology. Accordingly, a Centralised Information Management System

(CIMS) has been implemented which provides end-to-end e-governance functionalities to its stake holders such as officers/ staff of various departments of RBI, regulated entities, and general-public. The important features of CIMS are as follows which will be explained in successive paragraphs:

1. Multiple data collection channels such as system-to-system data transmission, file upload, application programme interface (API) and screen-based data submission.
2. Data submission monitoring dashboards, system driven validations and error reports, and centralised analytical platform.
3. Multiple layers of users and decentralised role-based user managements for horizontal and vertical access rights to database.
4. Data Governance functionalities with data lifecycle management and data protection by implementing Statistical Data and Metadata eXchange (SDMX).
5. Data sharing among regulated entities and public data dissemination

Centralised Information Management System (CIMS)

CIMS is a multi-layer application built on big-data Hadoop technology. It is processing data collected from 11,000 regulated entities and data from other sources which include both structured and unstructured data. Unstructured data refers to data such as social media feeds, news streaming and web-scrapping from Internet. Data processing layer provides data quality validation routines, data revision workflow and executes quite a lot of scheduled jobs for aggregation or summarisation of data to provide pre-defined analytics. Data are stored in Hive tables within Hadoop platform in repository layer with multiple objects to facilitate multi-dimensional data query and report generations. At dissemination layer, multiple portals developed to cater to the need for internal and external users and for general-public and researchers. The conceptual diagram is given below:

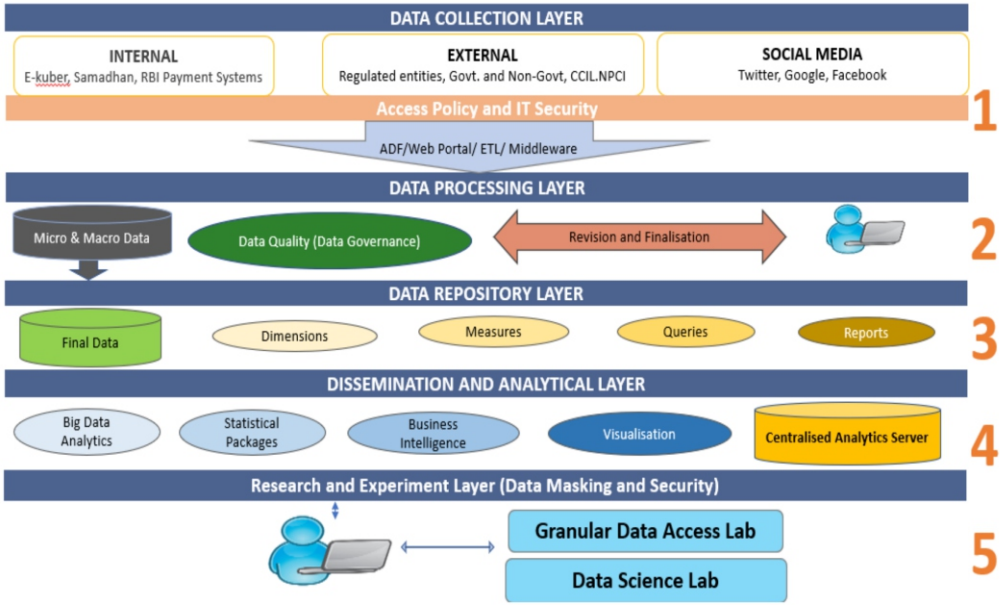

Chart 1: Conceptual Diagram of CIMS

Multiple data collection channels

The regulated entities are broadly of three types a) Scheduled Commercial Banks (SCBs), b) Co-Operative Banks, and c) Non-Banking Financial Companies (NBFCs). Out of 11,000 regulated entities, about 9,500 are NBFCs. The regulated entities are submitting 243 returns to RBI. The return templates are provided in the RBI website *(https://www.rbi.org.in/scripts/BS_Listofallreturns.aspx).* The maturity levels of IT are different across the regulated entities and accordingly multiple channels of data submission technology has been implemented. The team has studied about 50 banks during the project implementation phase and accordingly data collection architecture designed. For major banks with high level of technical infrastructure were chosen for system-to-system automated data collection. In this channel, the data are integrated at banks' end to a single system known as Automatic Data Flow (ADF) system. The data at desired format is generated at ADF and pulled by an application component of CIMS installed at banks' data center. Data Reporting and Management web-portal implemented for access by all regulated entities for data submission through file upload and screen-based submission. API channel of data submission is in advanced stage of implementation.

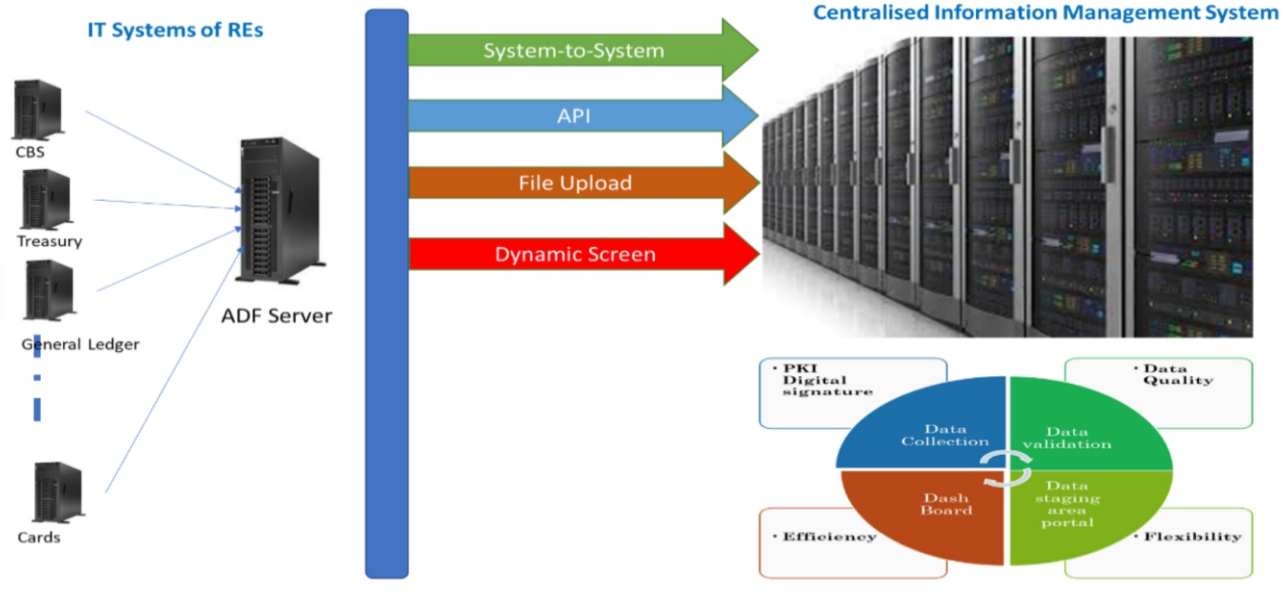

Chart 2: Data Collection Channels

Data submission monitoring and analytical platform:

Data submitted through multiple channels are collected in a central staging area at CIMS and then business validations are carried out based on rules specified for each return. The entity user given facility to login to DRM portal and monitor the status of specific submission. In case of any validation error encountered, the same is appearing in the portal along with details of errors. Also, system send e-mail alert to entity on validation failure. A mapping table is maintained in the CIMS on

applicability of the returns to specific entity and frequency of submission of returns to RBI. Also, the parameter is configured in the system to monitor timeliness of return submission with grace period, if any. System generates base report which reflects the data submitted by regulated entities. This provides window of reviewing data quality by the entities. System also provides window and work based for data revision in a controlled manner with approval from specific department of RBI. Based on these parameters system generates the dashboard for each entity which is being used by the compliance officers at entity to monitor whether applicable data or return submitted on time by the various section or division of the regulated entities. The departments of RBI have role-based access to the CIMS based on the allotted activities. The user of RBI department monitor using dashboard about how many regulated entities have submitted data on time and list of defaulters. The user is given facility to write e-mail directly from the system to entities.

A dedicated web-portal developed and implemented for catering the need of canned reports and data analysis. This is accessed by various users of RBI. A Business Intelligence (BI) tool implemented in CIMS to generate quick ad-hoc reports and extraction of data. Summary measure and common data platform created to facilitate power users for multi-dimensional query. An advanced analytical platform provided in CIMS for creating integrated "R" and "Python" programming environment for statistical analysis. The data access is restricted to users through user management module by allotting appropriate access rights to database.

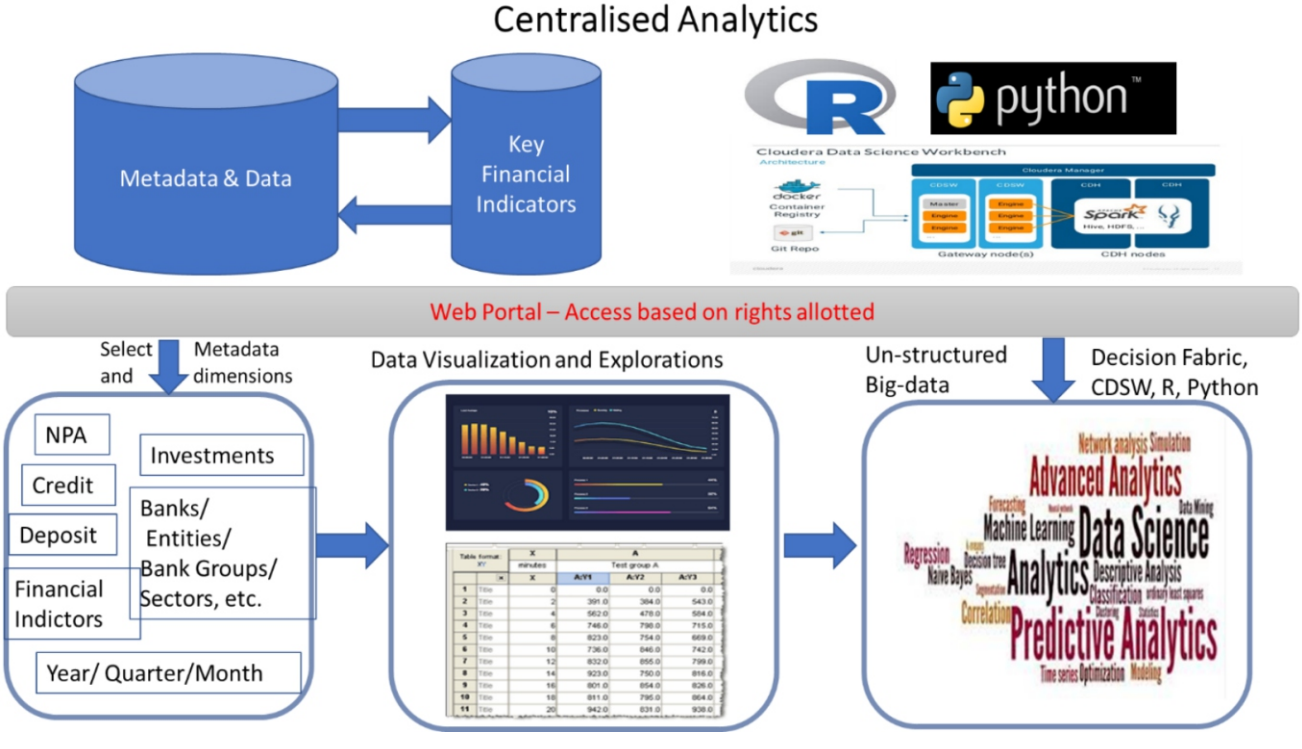

Chart 3: Centralised Analytics

User Management Module:

It was a big challenge to create and manage thousands of users and managing their activities. Accordingly, after lot of brain storming sessions a flexible role-based user management architecture and necessary functionality implemented in CIMS. All the functionalities of the portals such as data collection template uploads, screen-based data submission, base data reports, processed data reports, analytical tools, etc. are defined as the leaf level objects which are catalogued in the system. CIMS has the following portals:

- **Data Reporting and Management (DRM):** This is primarily accessible by all regulated entities for submission of data and departments of RBI for data submission and quality management. RBI department users and entity users able to check and monitor submission status. Data validations and other data governance related activities takes place in this portal. Also, this portal has functionality relating to User Access Management for entire CIMS.
- **Centralised Analytics System (CAS):** This is accessible by RBI users. This enables usage of data (through ready reports, dashboards and query). In addition, integrated analytics platform for structured and unstructured data also available facilitating advanced analytics.
- **Database on Indian Economy (DBIE):** This is the data dissemination portal accessed by general-public. This includes all publications of RBI with Time Series data, bank-branch location search, data query with metadata driven catalogue search, data download, etc.
- **Fraud, Remittance and Borrowing Status (FRBS):** This portal is meant for regulated entities for accessing information shared by Bank relating to fraud (Central Fraud Registry), remittance limit validation (LRS) as per RBI policy and large credit status (CRILC). All these three areas also have specific API based facility for system-to-system connect from banks/ regulated entities IT system such as Core Banking System (CBS).
- **SAARC Finance DB Portal (SFDB):** The portal contains macro-economic data of the SAARC countries and are accessed by users of respective countries for submitting related data. This portal also accessible by general-public.
- **Survey Web Portal (SWP):** This is a dedicated portal for survey related activities e.g., data collection from agencies, house-hold survey participants, corporate participants, etc.

There are two broad types of users a) users of various departments of RBI, and b) users of regulated entities. Two super admin users created by system which is maintained by CIMS administrators. These two super admins users have rights to create local administrator for various departments of RBI and regulated entities. User creation rights are allotted to local administrators with allotment of applicable access rights relating to those departments and entities. The department administrator (which is local administrator) creates users for that departments and allocate roles to provide specific access rights. Similarly, the entity admin creates users for that regulated entity.

A group of functions of a web-portal are made as role. The system provides facility of role

management for creation, modification, and maintenance of roles. Roles in the system are allotted to users for providing vertical access to the database. While entity allocation to a department user provides horizontal access to the database. For example, a user provided access to a role for data relating to Asset Liability Exposure (ALE) (which is a supervisory return) have vertical access to the ALE data which is then restricted to specific entities for which access given to the specific user. This provides horizontal restrictions to the database.

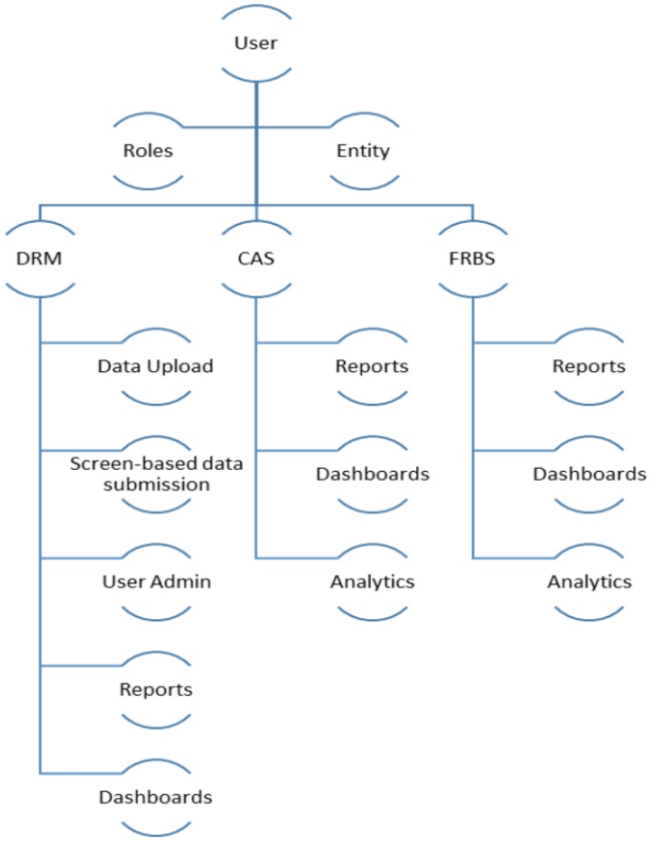

Chart 4: User Access Management

Data Governance Functionalities:

Data governance deals with putting in place organisation structure around data lifecycle management, preparation and implementation of policies especially relating to data security aspects and implementing IT Systems compliant with IT security. Creating data catalogue and other information about data are part of metadata management. Classification of data asset and providing data security in terms of appropriate data access management is the key for data protection. SDMX is an international standard facilitating the management and exchange of statistical data and metadata. It establishes common formats, protocols, and guidelines for sharing data among statistical agencies, international organizations etc. in seamless manner. SDMX key components are

Data Structure Definitions (DSD), XML-based Message Format, Web Services-API, Code Lists, Metadata, registry etc.

SDMX elements has been created from all the 243 returns and all the macroeconomic reports. Metadata definitions for these elements has been prepared. To manage related masters and mappings, and to enhance transparency, SDMX manager module has been developed in Data Reporting Management (DRM) portal of CIMS. These mapping tables are stored in a custom-built Converter tool, which is used to convert the return-based data to element-based data, and vice-versa, using forward and reverse engineering. Using this tool, data conversion and migration of all the returns and reports has been completed. Element-specific queries has been written to test the completeness of the elements in Query Surge tool, to ensure any data captured in the returns is not missing out. These queries are re-usable and flexible to be altered when required in specific situations (for example a change in element definition, and the corresponding metadata).

Data sharing and data dissemination:

RBI disseminate data as public good though DBIE web portal. This portal contains data relating to almost all the aspects of Indian economy. A Data Query functionality has been added recently which facilitate to explore SDMX metadata and provide platform for public to carryout visual analysis by charting variables with respect to time. It provides selection of data elements, filtering conditions and time selection for fetching data and then plotting them in a single chart as shown below:

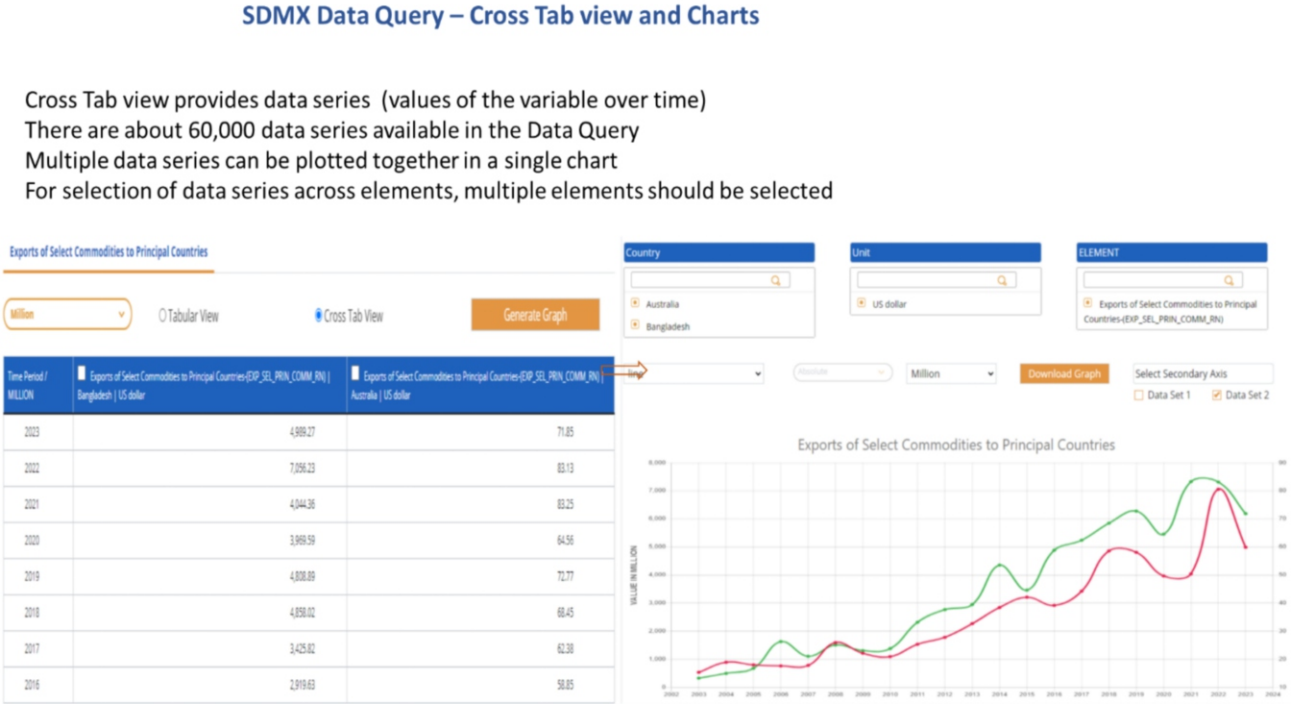

Chart 5: Data Query

The SAARC countries macro-economic data is shared by respective countries directly in the CIMS and data are then validated and shared as public portal. The data query functionality has been implemented in SFDB portal.

Conclusion:

The CIMS with its e-Governance portals having lot of functionalities have immensely benefitted its stake holder users for data collection, data processing and data usage for policy making by building reports and analytics. It facilitates to compile and publish data under publications and statistics as public good. It has an in-built analytical framework with "R" and "Python" which will facilitate to build various business cases exploring Artificial Intelligence (AI) / Machine Learning (ML) based applications.

CHAPTER 3

Implementation of Integrated Pharmaceutical Database Management System: Facilitating regulatory compliance through an integrated digital platform

Authors:

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Abstract:

The National Pharmaceutical Pricing Authority (NPPA) established in 1997 by the Government of India regulates and monitors the drug prices to ensure the availability and affordability of essential drugs. NPPA's key responsibilities include fixing and revising drug prices as per the provisions of the Drugs Prices Control Order (DPCO), monitoring compliance, and rendering advise on pharmaceutical policies.

The Integrated Pharmaceutical Database Management System (IPDMS) 2.0, implemented by NPPA is a comprehensive digital platform designed to manage, regulate, and monitor various aspects of pharmaceutical products related to their prices and availability. Key features include a centralized database, real-time data collection, automated reporting, compliance monitoring, advanced data analytics, and a stakeholder portal. IPDMS 2.0 enhances transparency, efficiency, and accountability. The Pharma Sahi Daam (PSD) mobile app, integrated with IPDMS 2.0 allows consumers to verify drug prices, compare brands, and access information in real-time, thus promoting transparency and informed decision-making.

The impact of IPDMS has been substantial, with over 1,523 companies registered, and listing of 98,528 medical devices and 133,697 medicines. The system has processed 145,161 forms and addressed 4,976 overcharging cases, ensuring compliance with pricing regulations. Currently, implementation of IPDMS 2.0 has significantly improved regulatory oversight and in future it will shape the service delivery further with advanced data analytics and integration with other government database(s).

Keywords: Digital platform, Drugs Prices Control Order (DPCO), Essential drugs, Integrated Pharmaceutical Database Management System (IPDMS), Pharma Sahi Daam (PSD)

Introduction:

The Indian pharmaceutical industry is a significant player in the global pharmaceutical landscape and ranks 3rd globally in pharmaceutical production by volume [1]. India accounts for 60 percent global vaccine production and thus has the world's largest vaccine production facility by volume. India is also the largest global supplier of generic medicines, having a 20-22 per cent share in the global supply of generic drugs in terms of volume. This has earned it the sobriquet the "pharmacy of the world" [2]. It contributes a significant 1.72% to the India's GDP [3]. In terms of its size, the Indian Pharmaceutical Industries is currently valued at $ 50 Billion and is expected to reach $ 130 billion by 2030 [4]. Indian medicines reach 200+ countries contributing to availability of affordable quality medicines, wellness products, bulk drugs, and intermediates. The Indian Pharmaceutical Industries played a very significant role in supply of drugs during COVID pandemic. India produces more than 500 APIs and 60,000 generic drugs across 60 therapeutic categories. The Indian pharmaceutical industry includes a network of 3,000 companies and 10,500 manufacturing units [5].

While the pharmaceutical sector was growing, the government was cognizant of its role in providing affordable healthcare to its people. The World Health Organisation (WHO) guideline on country pharmaceutical pricing policies (2020) notes that affordable access to safe and efficacious pharmaceutical products is at the core of global efforts towards achieving universal health coverage [6]. Keeping in view the socio-economic milieu, the government is aware about the importance of keeping drugs affordable and through various policy interventions since early 1960's has ensured the availability, affordability and accessibility of drugs [7].

The New Drug Policy, 1994 envisaged the setting up of National Pharmaceutical Pricing Authority (NPPA). It was set-up in 1997 as an independent body of experts in the Ministry of Chemicals and Fertilizers, Department of Pharmaceuticals (DoP). NPPA was delegated the powers to implement and enforce the then extant Drugs (Prices Control) Order 1995 [8]. The functions of NPPA, inter-alia, include fixation and revision of prices of scheduled formulations under the Drugs (Prices Control) Order (DPCO), as well as monitoring and enforcement of prices. NPPA also provides inputs to the Government on pharmaceutical policy and issues related to the affordability, availability and accessibility of medicines.

The Government notified National Pharmaceutical Pricing Policy, 2012 (NPPP- 2012) with an objective to put in place a regulatory framework for pricing of drugs so as to ensure availability of "essential medicines" at reasonable prices even while providing sufficient opportunity for innovation and competition to support the growth of the industry, thereby meeting the goals of employment and shared economic well-being for all [9]. Based on the NPPP, 2012, the Government notified Drug (Prices Control) Order, 2013 on 15th May, 2013 in supersession of DPCO, 1995. NPPA is currently implementing the DPCO, 2013, which regulates and monitors the prices of pharmaceutical as well as medical devices sectors. Ceiling prices of 'essential drugs' as listed in the First Schedule of DPCO, 2013 are fixed based on 'market-based data'. Price control is applied to specific formulations

with reference to the medicine (active pharmaceutical ingredient), route of administration, dosage form / strength as specified in the First Schedule. The prices of other drugs are monitored.

Apart from consumers/patients, pharmaceutical and medical devices industries are important stakeholders being regulated entities. As per various provisions of DPCO, 2013 there are regulatory Forms to be submitted by the companies as part of regulatory compliance. To facilitate regulatory compliance and 'ease of doing business', NPPA implemented Integrated Pharmaceutical Database Management System (IPDMS) in 2015. This comprehensive online system which was envisaged as Pharma Data Bank (PDB) provided a platform to the Pharmaceutical Manufacturer/ Marketing/ Importer/ Distributor Companies to file mandatory returns prescribed in Form II, Form III and Form V of Drugs (Prices Control) Order, 2013 (DPCO, 2013) [10]. However, this online system was not capturing the full gamut of Forms to be filed by the companies. Hence, an upgraded version i.e. IPDM 2.0 looking at service delivery of tomorrow was launched in 2022.

Integrated Pharmaceutical Database Management System (IPDMS) 2.0:

It is well-documented that information technology can potentially be used effectively to facilitate regulatory information management and compliance assistance [11]. Hence, IPDMS 2.0 an initiative of the NPPA is a comprehensive digital platform designed to manage, regulate, and monitor prices of pharmaceutical products and medical devices. The system is a significant step towards enhancing transparency, efficiency, and accountability in the pharmaceutical and medical devices sector. IPDMS 2.0 allows the companies to submit all the Forms related to pricing of pharma products and medical devices in an online mode with user friendly interface. Submission of these forms is a major regulatory compliance requirement under the DPCO.

The multi-instance architecture of IPDMS 2.0 has the capability to give multiple users access over a public network infrastructure. It is based on Relational Database Management System (RDBMS) for easy retrieval of information and better performance. The application has been developed by Centre for Advance Computing (C-DAC) [12]. Further, this cloud-based application was implemented to strengthen the internal processes followed in the NPPA through existing system of monitoring and controlling prices of drugs and medical devices. With a view to provide the NPPA with an enabled and capable system, IPDMS 2.0 also integrates Web and Mobile Apps developed and deployed for complaint management and instant availability of drug prices related information.

Key Features of IDPMS 2.0:

Centralized database and application server: All application servers, database and system components are hosted centrally. The IPDMS provides a centralized repository for all pharmaceutical and medical devices data, including sales, production, and pricing related data. This centralization ensures that all data is easily accessible and can be efficiently managed and analysed.

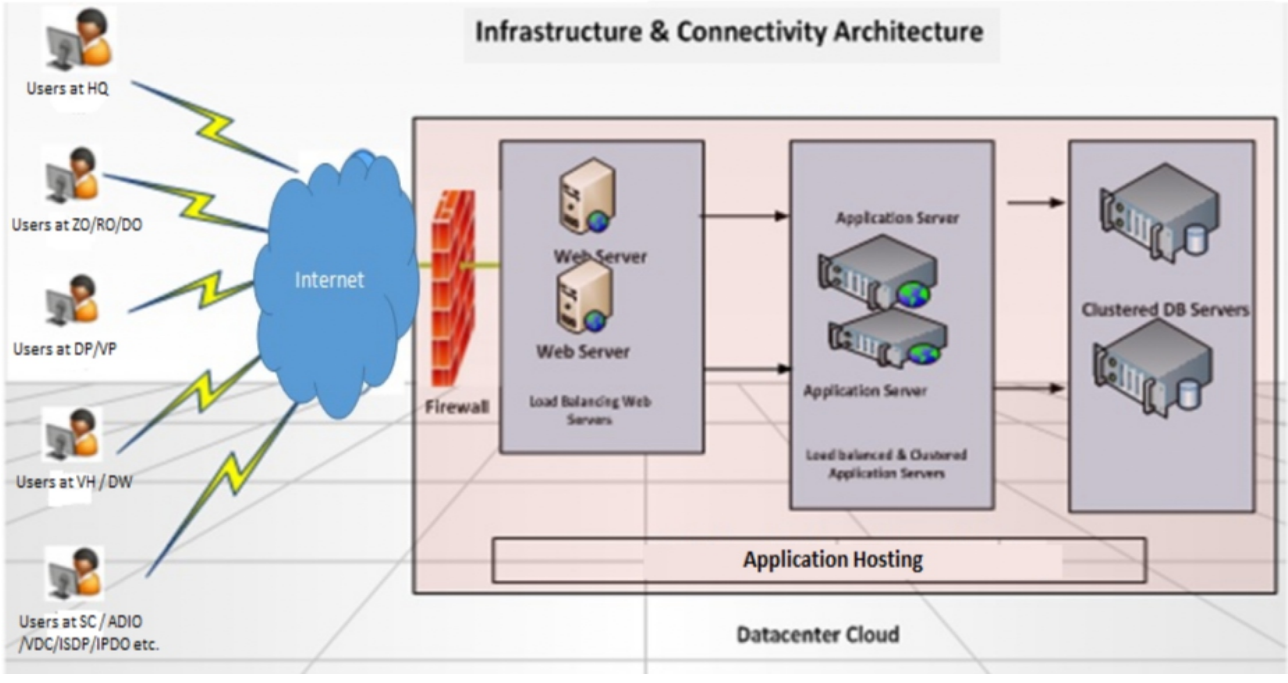


Figure 1: IPDMS 2.0 deployment architecture

Security: Authentication of users is through login and passwords and role/rule-based access controls. Sensitive data is encrypted and data sent across the network cannot be modified by a tier. Role based access and Web-Security Audits, User log of important transactions, OTP and Captcha authentications are other important features of the application. There is comprehensive audit trail and audit log system.

Real-Time Data Collection: The companies are required to submit their data in real-time. This includes information on drug production, sales, and pricing. Real-time data collection helps NPPA to monitor and regulate the market more effectively particularly for ensuring the availability of drugs.

Automated Reporting: The system automates the reporting process, reducing manual errors and ensuring timely submission of necessary data. Automated reporting also allows for quicker data analysis and decision-making.

Compliance Monitoring: IPDMS tracks compliance with the Drug Price Control Order (DPCO) and other regulatory guidelines.

Data Analytics: The system includes advanced data analytics tools that help in analysing trends, identifying anomalies, and making informed decisions. These tools can generate various reports and dashboards to assist NPPA in monitoring the pharmaceutical market effectively.

Stakeholder Portal: IPDMS provides a dedicated portal for stakeholders, including pharmaceutical companies, Price Resource Monitoring Units (PMRUs) in different States/UTs, staff of NPPA and the

public. This portal enhances transparency and allows stakeholders to access relevant information, submit data, and communicate with NPPA.

Alerts and Notifications: The system can send automated alerts and notifications to stakeholders about important updates, compliance deadlines, or any anomalies detected in the data. This ensures timely action and keeps all parties informed.

Public Awareness and Transparency: IPDMS implemented by NPPA enhances public awareness and transparency by providing accessible, real-time data on drug pricing and availability. This transparency empowers stakeholders to make informed decisions and fosters accountability among pharmaceutical companies.

Key Functions of IDPMS 2.0:

IPDMS 2.0 has been designed to automate the workflow of various functions performed by NPPA like fixation of prices; monitoring of prices; handling of complaints; supervising the activities of PMRUs, etc. By automating the workflow of different divisions of the NPPA, IPDMS 2.0 streamlines processes and reduces manual intervention in different activities. All the divisions are interconnected to process different routine activities which are otherwise processed through manual isolated files. This helps in improving efficiency and reducing the time required to complete tasks. The IPDMS also addresses the issue of duplicity of work by centralizing and standardizing data and processes.

Complaint management and monitoring is done through following:

Complaint Management System (CMS): A robust CMS is in built in IPDMS to manage and address grievances related to drug pricing, availability, and compliance with regulatory requirements. This system ensures that stakeholders, including consumers, companies, and healthcare providers, can report issues and seek resolutions efficiently. The entire work flow from lodging of complaint and ticketing system to tracking of complaints till resolution is automated.

Notice Management System (NMS): NPPA monitors the prices of essential medicines covered under the DPCO to ensure compliance with price caps and ceiling prices. When the companies are found to be selling drugs above the permissible prices, NPPA issues overcharging notices to notify the concerned companies of the violations. The entire process of generating the different notices like Preliminary Notices (PN), Show-cause Notices (SCN), and Demand Notices (DN), dissemination and receiving replies from the companies is digitised as part of IPDMS 2.0.

Regulatory Compliance: IPDMS 2.0 facilitates the pharmaceutical and medical devices companies in complying with the various provisions of DPCO. It tracks the compliance status of each company and highlights any deviations from the prescribed norms, facilitating timely intervention by the regulatory authority.

Market Analysis: By analysing production and sales data, NPPA can identify market trends, assess the availability of essential drugs, and prevent shortages, if reported.

Decision Support: The analytics and reporting capabilities of IPDMS provide crucial support for decision-making. NPPA can use the insights gained from the system to formulate policies, set price caps, and undertake regulatory actions that ensure the availability of affordable medicines.

Consumer Protection: An important function performed by IPDMS 2.0 is to protect the consumers by ensuring that medicines are priced fairly and this information is easily accessible and available to them.

Integration of IPDMS 2.0 with Pharma Sahi Daam (Mobile Application):

Upgraded version of Pharma Sahi Daam (PSD) mobile application was launched by the NPPA along with the IPDMS 2.0. PSD is available on Android as well as Ios platforms. This app is designed to empower consumers and stakeholders by providing real-time information on prices of scheduled medicines. Pharma Sahi Daam and IPDMS are inter-connected with the Complaint Management System (CMS).

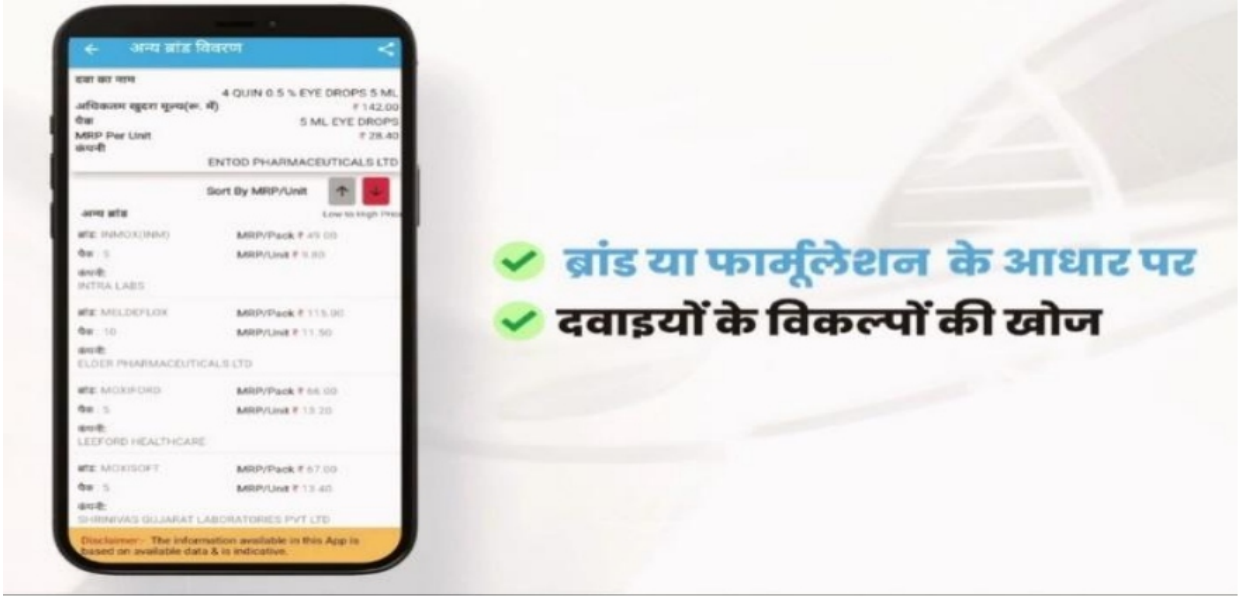


Figure 2: Search feature of PSD

The uses and the salient features of PSD are:

- PSD facilitates consumer to verify the ceiling prices for a particular medicine
- Users can search for the prices of different brands by formulation name, and can also define the dosage form and strength of the formulation
- Users can search for medicines by their generic names or brand names and compare prices across different brands or generic versions
- Users can compare the prices of alternate brands for the same formulation
- User can also search a particular medicine by voice search (Speech recognition)
- User can share the information regarding a particular medicine with their doctors, friends and family members and they can also bookmark medicine frequently bought by them
- User can lodge a complaint also through the App
- PSD can be accessed in two languages, English & Hindi.

Overall, Pharma Sahi Daam is the digital tool for promoting transparency in drug pricing and empowering consumers to make informed choices while purchasing medicines. It aligns with NPPA's efforts to ensure affordability and accessibility of essential medicines in India's healthcare system.

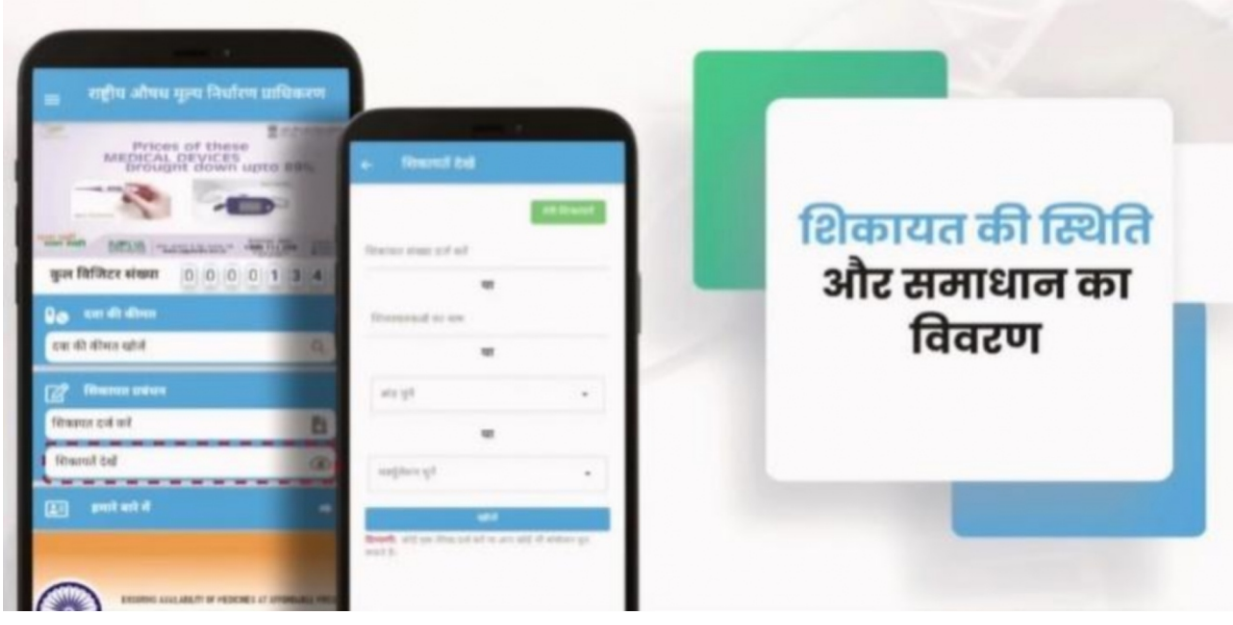


Figure 3: Complaint registering feature of PSD

User training and stake holder participation:

To make the initiative more successful, it is essential to enhance digital capacity of all the stakeholders. The detailed plan and administrative & technical guidance about the IPDMS 2.0 were discussed/explained through various audio-video conferences, meetings, online-offline training sessions, demonstration of the application, audio-video/textual manuals to the stakeholders. The support documents are easily accessible and downloadable from IPDMS 2.0 portal itself.

Stakeholder Collaboration and Training Programs: Engaging stakeholders through collaboration and providing comprehensive training programs has ensured successful adoption and implementation of IPDMS.

Continuous Monitoring and Feedback Mechanisms: Establishing continuous monitoring and feedback mechanisms through dedicated IT Cell with members drawn from NPPA and CDAC team has allowed for timely addressing the issues raised by the stakeholders and opportunities for continuous improvement.

Data Security and Privacy Measures: Implementing robust data security and privacy measures to protect sensitive information garnered confidence in the stakeholders.

Acceptance of the IPDMS 2.0: The impact of implementation of IPDMS 2.0 can be significant, particularly in terms of its demographic and geographical reach. Here's how the IPDMS has impacted different demographics and geographical regions:

Demographic Reach: Urban and Rural Populations, Low-Income Groups: The innovation could have a positive impact on low-income groups by ensuring that essential drugs are available at affordable prices and by reducing the potential for data non-congruencies or price manipulation.

Geographical Reach: Remote and Rural Areas, Across States and Regions: The IPDMS shall have a positive impact in remote and rural areas, across States and regions by ensuring availability of price related information of essential drugs on finger tips.

Key Statistics

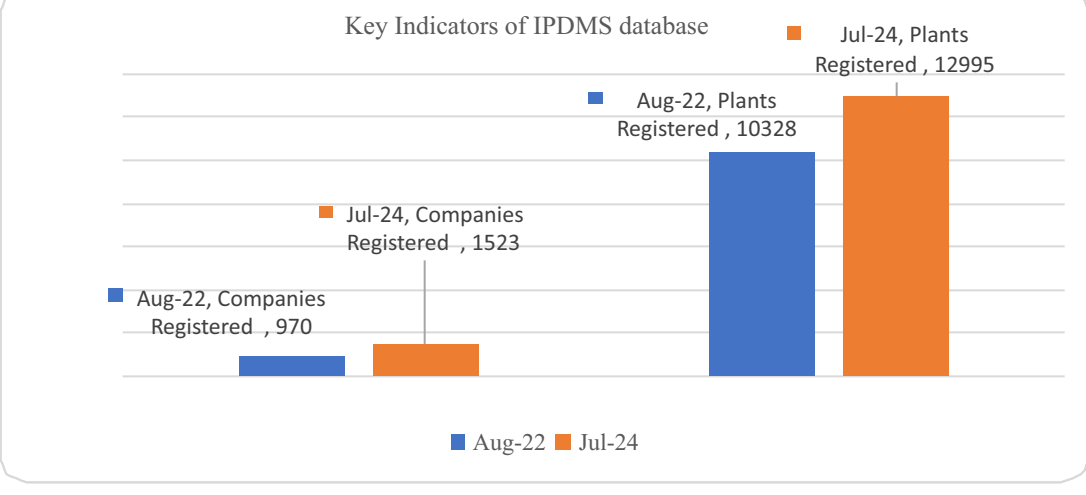
A total of 1523 pharmaceutical and medical devices companies are registered on the IPDMS as on 15.07.2024 **(Chart -1)**. These companies have registered 1,33,697 medicines **(Table 2)** and 98,528 medical devices **(Table 2)** till date. The companies have filed a total of 1,45,601 forms **(Form I to VI of DPCO,2013)** in IPDMS as given in Table 1 below.

Form as per DPCO,2013	Number in IPDMS 2.0
Form-I	407
Form-II	13289
Form-III	37062
Form-IV	108
Form-V	60056
Form_VI	34679
Total	**145601**

Table 1: Status of submission of various forms in IPDMS 2.0

Indicator for pharma	August-22	July-24
Companies Registered	970	1361
Plants Registered	10328	12561
Products Registered	107331	133697
Indicator for medical devices	**August-22**	**July 2024**
Companies Registered	-	162
Plants Registered	-	434
Products Registered	-	98528

Table 2: Key indicators of IPDMS 2.0 database for pharma and medical devices companies



A total of 4976 alleged overcharging cases were received on IPDMS 2.0 from PMRUs, State Drug Controllers, and the public.

As per the current DPCO provisions non-filling of forms and information by the manufactures/marketers on IPDMS 2.0 does not attract any penalty. Hence compliance in terms of coverage i.e. numbers of companies and products are low and filling of various forms is also irregular.

Way forward: Decoding data and Integration:

Efforts are afoot to integrate the IPDMS 2.0 database with Sugum portal of Central Drugs Standard Control Organisation (CDSCO) where data is captured at the time of granting licences to various pharma products. In addition, there is further scope for integration of IPDMS 2.0 with the State Level Licensing Authorities (SLAs) and the National Health Authority (NHA).

Notwithstanding this the learning's from current data being collected in IPDMS 2.0 has the tremendous potential to tailor future service delivery systems. Nitin Seth, the author of the book Mastering the Data paradox: The key to winning in the AI Age, calls our age the "data-first world" and emphasises the value of data and the quality of data being collected. It is also important to use this data to convert it into actionable insights. In the context of IPDMS 2.0, this can be explained further with an example. Data regarding production of drugs categorised as 'essential' as per DPCO,2013 is collected and a number of analytics can be run on it to provide information on availability of stocks of these drugs; an increase/decrease in their production; geographical distribution of companies manufacturing these drugs, etc. In case of decrease in production of any drug, system can generate an alert that can be analysed further to establish whether the decrease is temporary or there are any underlying systemic issues. Similarly, mapping of information based on geographical location of a company can be useful for making these drugs available in case of complaints of non-availability of drugs received from consumers in the PSD.

Conclusion:

As stated earlier, the stated objective of NPPP, 2012 is to strike a balance between the growth of the industry and the public's need for affordable healthcare. IPDMS 2.0 collects data not only from the Pharmaceutical & Medical device companies but also consumers. The implementation of the IPDMS 2.0 by the NPPA epitomizes the transformative power of e-governance in the pharmaceutical sector and marks a significant advancement in the regulation of drug prices in India. This digital platform has brought about a paradigm shift in how data is managed, monitored, and analysed, ensuring greater transparency, efficiency, and accountability. This digital platform has streamlined the processes of monitoring and compliance enforcement, ensuring that the objectives of the DPCO are met with greater precision and efficiency.

This e-governance initiative has not only streamlined internal processes within NPPA but also provided a robust platform for compliance tracking and enforcement, ensuring that pharmaceutical companies adhere to pricing norms as stipulated under the Drug Price Control Order (DPCO), safeguarding the interests of consumers and ensuring the availability of essential medicines at reasonable prices.

The integration of the Pharma Sahi Daam mobile application with IPDMS 2.0 has further democratized access to drug price information, enabling consumers to make informed decisions and fostering a culture of transparency and accountability within the pharmaceutical sector. With over 1,523 companies registered and thousands of formulations and medical devices listed, IPDMS has become a cornerstone in the regulatory landscape of India's pharmaceutical industry.

Going forward, the continued success of IPDMS 2.0 will depend on sustained stakeholder engagement, ongoing enhancements to the system's capabilities, and robust data analytics and security measures. Further, work will have to be undertaken to integrate other government database(s) so that a unified solution digital platform can evolve. By maintaining its commitment to innovation and regulatory excellence, NPPA can ensure that the benefits of IPDMS 2.0 are fully realized, ultimately contributing to a more equitable and accessible healthcare system for all Indians.

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CHAPTER 4

Deepening Service Delivery at the grassroots

Authors:

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Abstract:

Decentralized governance is an instrument for multifaceted development, ensuring effective and equitable growth at the grassroots level. Governments are working towards strengthening democracy at the lowest levels, improving governance, bringing efficiency in the delivery of government services, thereby giving voice to the people. [1] It has long been felt that the traditional government structure and systems are no longer adequate to meet the demands of rising citizen aspirations. The availability of constantly improving technological solutions coupled with innovative managerial tools has given rise to improved administrative structures, efficient and effective public service delivery systems, and the increasing quality of governance. Governments and governance the world over are undergoing a 'paradigm shift' from their traditional roles and structures of inflexible control and procedure orientation towards result orientation, flexibility, facilitation and a citizen-centric approach.

Service delivery forms the bulwark of any efficient administration. Administrative services at the grassroots level aim to provide services to the people by contacting them directly, redressing their grievances and improving their lives. Therefore, it becomes even more vital that the Panchayats deliver services to the village residents in an accessible and time-bound manner.

Keywords: [Panchayati Raj], [Service Delivery], [e-Governance], [Citizen Charter], [Grassroots Service Delivery]

Introduction:

The 73rd Amendment to the Constitution, made effective from April 1993, has institutionalized the Panchayats as the units of local self–government. Panchayats represent the first level of Government interaction for over 60% of the Indian population and constitute the third tier of government in rural areas, are fundamental for bottom-up, multifaceted development, and for ensuring effective and

equitable delivery of services at the grassroots level. Therefore, it becomes essential that Panchayats bring in and ensure good governance measures, ensuring greater participation of the poor and marginalized in the decision-making process, promoting the rule of law, ensuring protection of citizens, reducing corruption and enhancing efficiency in delivery of public services. [2]

Service delivery forms the bulwark of any efficient administration. Administrative services at the grassroots level aim to provide services to the people by contacting them directly, redressing their grievances and improving their lives. Panchayats typically perform three types of functions, viz.

- **Mandatory services:** Issue of various certificates; registration of birth and death; marriage certificates, permission for building construction, compound walls, and licenses or permits for different purposes are the mandatory services of Gram Panchayats.
- **Civic functions:** Gram Panchayats provide several civic functions to the society like disposal of solid waste, cleaning public markets, prevention of communicable diseases, public comfort stations, slaughterhouses, protection of drinking water and wastewater removal.
- **Provision of basic infrastructure:** Gram Panchayats provide basic infrastructure facilities like streetlights, upkeep of burial grounds, bath and washing ghats, ferry services in rivers and backwaters, protecting canals, waterways ponds and other water sources etc.

Therefore, it becomes even more critical that the Panchayats can deliver services to the village residents in an accessible and time-bound manner.

Citizen Charter:

India's journey with the Citizen Charter was initiated in 1997, wherein an 'Action Plan for Effective and Responsive Government' at the Centre and State levels was adopted in the conference of Chief Ministers of various States and Union Territories held on 24 May 1997 in New Delhi. [3]

The basic objective of the Citizens Charter is to empower the citizens about public service delivery. Six principles of the Citizens Charter movement as originally framed, were:

I. **Quality:** Improving the quality of services
II. **Choice:** Wherever possible
III. **Standards:** Specify what to expect and how to act if standards are not met
IV. **Value:** For the taxpayers' money
V. **Accountability:** Individuals and Organisations and
VI. **Transparency:** Rules/ Procedures/ Schemes/Grievances[3]

Subsequently, with the introduction of a service excellence model called 'Sevattom' in 2005, a new thrust was provided to the implementation of citizen charters. [4]

In 2011, the Right to Public Services legislation was introduced by the Government of India. The right to public services legislation comprises statutory laws which not only guarantee time-bound delivery of services for various public services rendered by the Government to its citizens but also provide a mechanism for punishing the errant public servants who are deficient in providing the service stipulated under the statute. Right to Service legislation is meant to reduce corruption among government officials and to increase transparency and public accountability. In addition, what was under the Citizens' Charters an administrative guarantee has been translated into a legal right, justifiable under the various Right to Public Services (RTPS) Acts. [3]

However, there have been missing institutionalized standards for the delivery of public services at the grassroots level. Therefore, there always appears to be a tussle between the governmental systems, its capability to deliver and the actual needs of the citizens. Though having recognized the need to govern and place the common requirements and aspirations of the people on the highest priority for service delivery, progressive governments have found that the governing process itself comes in the way of their attempts to establish a positive relationship with its citizens. With the advent of the information age and the emerging knowledge regime, citizens are no longer satisfied with services which can be delivered only by frequent visits to government offices, standing for hours in long queues, or after time-consuming lengthy processes.

To establish a service quality paradigm, with an intent to standardize the delivery of Services across the Panchayats, setting service standards, the time limit that the people can expect to be served, mechanisms for redressing grievances, and a provision for unbiased scrutiny by citizens, a Model Citizen charter was released by Hon'ble Minister, Panchayati Raj, Rural Development & Agriculture and Farmer Welfare on 04th June 2021. [5]

Release of Model Citizen Charter by Hon'ble Minister, Panchayati Raj, Rural Development & Agriculture and Farmer Welfare[1]

This helped standardise the delivery of Services across the Panchayats, setting service standards, the time limit that the people can expect to be served, mechanisms for redressing grievances, and a provision for unbiased scrutiny by citizens, making the Panchayats and its representative directly accountable to the people.

Benefits of Citizen Charter in effective service delivery in Panchayati Raj Institutions (PRIs)

- **Basic service provision:** access to drinking water, sanitation facilities, primary healthcare etc.
- **Poverty alleviation and inclusive development:** rural-urban divide and promoting balanced regional development
- **Local economic growth:** Attract investments, promote local businesses, and create livelihood opportunities
- **Localising Sustainable development:** Sustainable resource management and environmental protection.
- **Strengthening democracy and citizen participation:** Trust, social cohesion, and sense of ownership

Taking cognisance that improved efficiency of public services, has a notable influence on the quality of digital lives, minimizing bureaucracy, corruption and increasing transparency in the public offices, the Citizen Charter campaign under the aegis of Meri Panchayat, Mera Adhikaar- Jan Sevaayein Hamare Dwaar was carried out from 01stJuly- 30thSeptember 2021 with an intent to of making the role of Panchayats in Service Delivery meaningful and fulfilling. The campaign culminated in the signing of the Mysuru Declaration on 22ndNovember 2021 by 20 States that resolved to roll out the Core common minimum service (7 no.) viz. Issuance of Birth Certificate; Death Certificate; Residence Certificate; Marriage Certificate; Issuance of Construction permit; MGNREGA-related services; TPDS-related services by the Panchayats across the country from April 1, 2022. [6][7]

[1] https://panchayat.gov.in/

Panchayat Charter- Campaign Objective.[2]

[2] https://panchayatcharter.nic.in/

The ultimate aim is to ensure ease of living for the rural populace, establishing Panchayats as a credible Public Office& centre of delivery of services, giving a response under the extant rules, regulations, and accepted way of life in the society.

As of date, 2,15,628 Gram Panchayats across 30 States/ UTs have now finalised their Citizen Charter, offering over 900 Services spanning various sectors viz. Health & Family Welfare, Drinking Water & Sanitation, Public Welfare, Employment etc. [8]


पंचायती राज

पंचायत नागरिक चार्टर

ग्राम पंचायत मौहड़ा

विकास खण्डः अल्हैपुर – धामपुर, जनपद– बिजनौर

नीरज कुमार
ग्राम पंचायत अधिकारी

ऋषिपाल सिंह
ग्राम प्रधान

Charter2. Sample Panchayat

Challenges in the Delivery of Services:

The services which are provided by the States are different from one another; however, there are common bottlenecks in the service delivery, which are:

I. **Lack of Powers to the Gram Panchayats (GPs):** There is a wide chasm between the powers given and the powers exercised. The GPs are yet to be given powers w.r.t formulation and implementation of programs/ schemes under agriculture, animal husbandry, small-scale industries, PDS, etc. All these are still under the purview of line departments located at District and Block headquarters. The officials belonging to these departments hardly evince any interest in working with the GPs. Therefore, certain procedural changes need to be introduced, which would also require amendments to the existing Acts as most of them are covered under the Respective Department Act, and not under the Rural Development Department.[9]

ii. **Inadequate staff and competence:** Human resources play a very significant role in managing any organization whether it belongs to government or non-government. Gram Panchayats are local self-governments which are responsible for performing developmental and regulatory functions in their jurisdiction. Large variations in the Gram Panchayats across States in the case of physical strength of staff, both regular and temporary. [9] Moreover, Elected Representatives of the GPs are not fully trained about the Service Delivery Act. This is compounded by the lack of coordination by the line departments resulting in a lack of timely information of services or delays in providing services.[9]

iii. **Deficiency of digital resources:** Obsolete equipment, slow/no internet services, inadequacy of personnel to manage these services and delayed infusion of the technology have held the Panchayats back from robust service delivery.

Way forward:

Since the establishment of the Panchayati Raj system in India, both the Central and State Governments have implemented several measures to make Gram Panchayats a responsible administrative unit. It is now crucial for Panchayats to evolve into roles as service providers and facilitators, fostering stronger partnerships with line departments, civil society, and other stakeholders involved in service delivery.

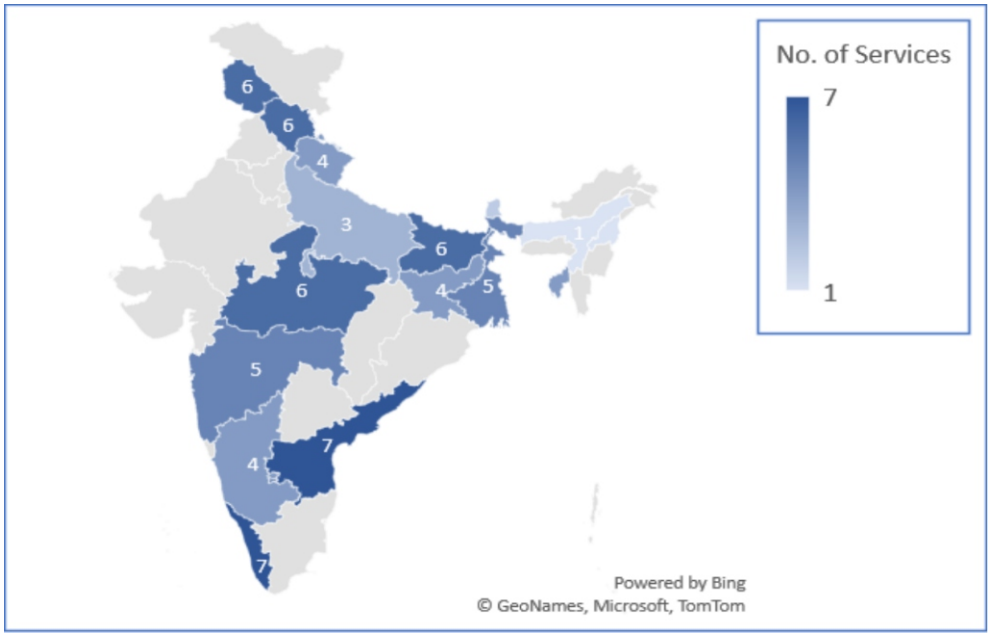
The primary goal is to ensure the guaranteed delivery of services directly to the doorsteps of rural residents in a timely and effective manner. The Panchayat charter was the first step in this direction, with each state committing to the Mysuru declaration to provide at least the core common services within a specified timeframe. Achieving this objective requires:

I. **Amendments to State acts and rules:** Introducing legislative and/ or procedural changes (where feasible) to facilitate service delivery at the grassroots level.

ii. **Definite Roles of Gram Panchayats:** Clearly delineating the specific roles and responsibilities of Gram Panchayats in the service delivery process.

iii. **Digital Transformation:** Transitioning offline services to online platforms, making them more accessible to rural populations.

It is heartening to note that amongst the 14 States that had signed the Mysuru Declaration, most of them are already delivering core-common services at the Gram Panchayat level viz. Birth/ Death/ Marriage/ Residence certificate, construction permit, MGNREGRA related services, targeted Public Distribution System services.



Mysuru Declaration- Service Delivery Status2.

Moving forward, the Ministry will be engaging in broader consultations with States to develop detailed service delivery roadmaps. This is towards attaining the PM's vision of Ease of living & Quality of Life for the citizens.

Additionally, it is essential to establish Village Secretariats as hubs for governance activities, service delivery, knowledge sharing, and training. Andhra Pradesh, Karnataka, Kerala & Uttar Pradesh are a few of the States that have taken up the Village Secretariat concept that could be emulated across India.

- **Andhra Pradesh has set up Village Secretariats** for every population of 2,000, with a Panchayat Secretary who functions as the Secretary/convenor of the Village Secretariat; each Village Secretariat houses village officials from different departments like health, education, revenue, etc. The Panchayat Secretary of the village secretariat acts as DDO (Drawing and Disbursing Officer) and the pay and allowances of all the staff of the Village Secretariat gets disbursed by her/him.[11]

Village Secretariat, Andhra Pradesh2.

- **Bapuji Seva Kendra (BSK)** is a unique initiative of Karnataka which was launched on 1st July 2016 by the Government of Karnataka by the Rural Development & Panchayati Raj (RDPR) Department. Bapuji Seva Kendras were set up across all the Gram Panchayats in Karnataka offering different services largely from RDPR, Revenue and other departments. In October 2020 services were also made available online through the BSK web portal and the new BSK 2.0 portal aims to further smoothen the citizen interface and experience while availing the servicesand enabling decentralization of Citizen Service Delivery at Gram Panchayats making it more accessible, leading to reduced travel time, and waiting time.[12]

Bapuji Sewa Kendra, Karnataka2.

- **Akshaya Centres** in Kerala have improved public service delivery by making services accessible to 'the common man' in her/ his locality. Kerala is one of the pioneering States in India to take the initiative for the mass transformation of ICT through the implementation of a district-wide e-literacy project 'AKSHAYA' in 2002, with the intention of 'Empowering Kerala'. The venture paved the way for the migration of Kerala to an e-literate State.[13]
- **Uttar Pradesh** has co- located Common Service Centres in the Panchayat Bhawans, with a designated Village Level Entrepreneur (VLE) entrusted to keep Gram Sachivalaya functional, establishing it as a gateway to service delivery to citizens- 216 specific services have been listed as the key role for VLE. [14]

VLE would ensure all Social Services to the villagers, executing all official works from Gram Sachivalaya viz. Online entry of e-Gram SWARAJ & Gram Panchayat Development Plans (GPDP); Geotagging of assets under Swachh Bharat Mission (SBM)/ Finance Commission etc.

Conclusion:

As the UN Secretary-General stated in 2020 the digital divide is now a matter of life and death[15], it becomes imperative that delivery of the basic services by the Panchayats, which are essential for the residents of the Panchayats is made available in a timebound manner. The Panchayati Raj institutions have given every indication that with the requisite legislative back-up, proper mapping of functions and the means to raise resources, they are fully capable of providing quality services to all our denizens. The Citizen Charter campaigns bears testimony to the positive impetus acquired merely by talking about the subject. It indicates that Panchayats are equal to the task- it is up to us to empower them.

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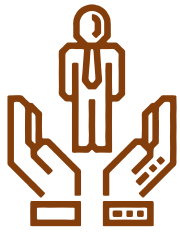
CHAPTER 5

Shaping Service Delivery for Tomorrow: Empowering Consumers Through Online Justice Delivery Using E-daakhil Portal



Authors:

1. **Smt. Nidhi Khare (IAS),** Secretary, Department of Consumer Affairs, Ministry of Consumer Affairs, Food and Public Distribution

Abstract:

Department of Consumer Affairs launched a scheme of 'Computerization and Computer Networking of Consumer Fora (Commissions) in the country, (CONFONET)' during the 10th Plan period in March, 2005 which aimed at fully computerizing all Consumer Commissions at all three tiers to enable digital access of information and quicker disposal of cases. But with marked shift in the consumer buying pattern and emergence of e-commerce platforms, digitization at source (consumer forums) alone was not enough and thus, digitization at consumer end also became a necessity for online resolution of consumer disputes. Therefore, e-daakhil portal was conceptualized and made available to consumers in September 2020. E-daakhil portal empowers consumers in the digitally transforming landscape and enables them to e-file complaints. The portal has seen a record growth in number of registered users, cases filed, cases admitted and cases disposed. Additionally, the portal has bridged the rural-urban gap by making e-filing service available uniformly across the commissions. This is substantiated by the fact that e-filing service is now available in all States and UTs except Ladakh. Through this paper we will study the transformative journey of e-daakhil portal and its impact on consumers.

Keywords: Consumer Protection, Consumer inclusivity, Online Justice, E-daakhil, CONFONET, productive judiciary, case disposal

Introduction:

The e-commerce industry in India is growing on levers such as increased smartphone penetration, increased affluence and low data prices, providing impetus for e-retail growth. With over 900 million users, India is the 2nd largest internet market in the world with 131.16 Lakh Cr UPI

transactions in FY 2023-24[1]. The e-commerce trend is gaining major popularity even in tier-2 and tier– 3 cities as they now make up nearly half of all shoppers and contribute three of every five orders for leading e-retail platforms. As much as it has eased the life of the consumers, it has also resulted in rising number of consumer disputes. Access to justice is the fundamental right and it is duty of the State to promote access to justice at door step and make it affordable for all its citizens [2].

This has necessitated the need for establishing a robust mechanism for online resolution of consumer complaints to ensure early delivery of justice. The e-filing/e-daakhil portal launched by Department of Consumer Affairs aptly caters to all these requirements across all the consumer commissions. Consumer Protection Act, 2019 provides for a three-tier quasi-judicial system with National Consumer Disputes Redressal Commission at the apex level, State Consumer Disputes Redressal Commissions across all states and District Consumer Disputes Redressal Commissions to serve at the lowest level.

The Department of Consumer Affairs, to enhance access to justice implemented CONFONET project in the back drop of The Consumer Protection Act, 1986 to provide a turnkey solution at each of the district forum, state commission & national level, including linkages with respective state and central governments. The E-daakhil portal on the other hand emerged as a brainchild of CONFONET scheme in the backdrop of Consumer Protection Act, 2019. Where CONFONET on one hand empowers judicial officers by digitizing the records and making the process of admission of complaints and hearing seamless, e-daakhil on the other hand empowers consumers by enabling them to e-file complaints and track the progress of their case, thereby, they together fulfilling the needs of both the provider and the recipient.

In this connection, this paper discusses the legislative framework and transformative journey of e-daakhil portal and its impact on consumers. Further this paper also discusses vision and future scope of improvement of e-daakhil portal.

Evoution of E-Daakhil Portal:

The e-daakhil portal is the outcome of a transformative journey since the inception of CONFONET. When in its formative years (2007-2008) as a Consumer Fora Network, CONFONET was laced with challenges. Department observed that none of the consumer commissions were automated and the consumer complaints were filed, heard and disposed only physically. Besides, there were many other gaps in the system which are discussed below.

Initial Challenges:

- Large number of pending consumer complaints that posed a limitation in digitalization of cases

- Scattered system across different commissions as separate URLs were used and there was a dire need to unify them with a single URL
- Missing documents and non-standard formats across commissions at different levels in different states
- Language barrier as complaints were filed in different languages across commissions and there was a urgent need for technological advancement to support different languages on a single platform
- Dearth of trained manpower at regional and local levels
- Unavailability of hardware and software for integration with the central system
- Lack of infrastructural and logistical support as multiple approvals were required across states for establishing and expanding technical labs. All this amidst limited supply of electricity and funds.

Overcoming Challenges:

The Department worked in a mission mode to overcome the challenges and provide a robust consumer redressal mechanism across the consumer commissions at all three tiers. The major boost to the CONFONET scheme was provided by:

- Development of a central application that was issued across commissions
- Migration from multiple URLs to single URL which was hosted at National Informatics Center (NIC) in the year 2014.
- Attempt to standardize formats and fonts across commissions
- Providing funds to district commissions for overcoming logistical barriers
- Providing software and hardware for onboarding offline consumer complaints on digital platform
- Providing third party support in the form of TSPs and DMAs to enable adoption of technology at the lowest level
- Providing feature of conversational AI to handhold consumers and address online queries and grievances
- Undertaking GAP analyses to understand the limitations faced by different consumer commissions and suggesting viable solutions.

Legislative Support:

The digitization of consumer commissions through the launch of CONFONET scheme aimed at providing technical support to consumer forums and its officials to manage consumer complaints digitally along with providing easy access to case related documents, orders and judgments, case status and history, standard formats through a centrally managed platform and with evolving technology, the platform is undergoing transformation each day. The idea is to adapt with latest technology and provide cost-effective, hassle free and speedy delivery of justice to the consumers. But with evolving consumer needs, breakdown of geographical barriers and consumer markets for goods and services having undergone a drastic change, it became inevitable to amend Consumer Protection Act, 1986 to make it more consumer specific and inclusive. The Consumer Protection Act, 2019 was thus, enacted with novel features such as e-filing of consumer complaints and simplifying the consumer dispute resolution process amongst others. This act includes various rules such as General Rules, Central Consumer Protection Council Rules, Consumer Disputes Redressal Commission Rules, Mediation Rules & Regulations, E-Commerce Rules, and Consumer Commission Procedure Regulations etc.

E-daakhil portal received strong legislative support from Consumer Protection Act, 2019 which came into force on 20th July, 2020 and Consumer Disputes Redressal Commission Rules, 2020[3], both of which aims to provide for timely and effective administration and settlement of consumer disputes. The relevant provisions of the Act and the rules are discussed below:

- **Section 35** of CP Act, 2019 in its Proviso provides for electronic filing of complaints before District Commissions.
- **Section 38 (6)** of CP Act, 2019 in its Proviso provides for hearing or for examination of parties in person or through video conferencing.
- **Section 49** of CP Act, 2019 provides for electronic filing of complaints before State Commissions.
- **Section 59** of CP Act, 2019 provides for electronic filing of complaints before National Commission.
- **Clause 7** of Consumer Disputes Redressal Commission Rules provides for mode of payment of fee for electronically filed cases.
- **Clause 8** of Consumer Disputes Redressal Commission Rules provides for manner of filing complaints electronically.

Thus, the e-daakhil portal was formally launched for NCDRC on 07th September, 2020. The process for onboarding other State and District Commissions is now complete as e-dakhil portal is operational across all commissions except Ladakh.

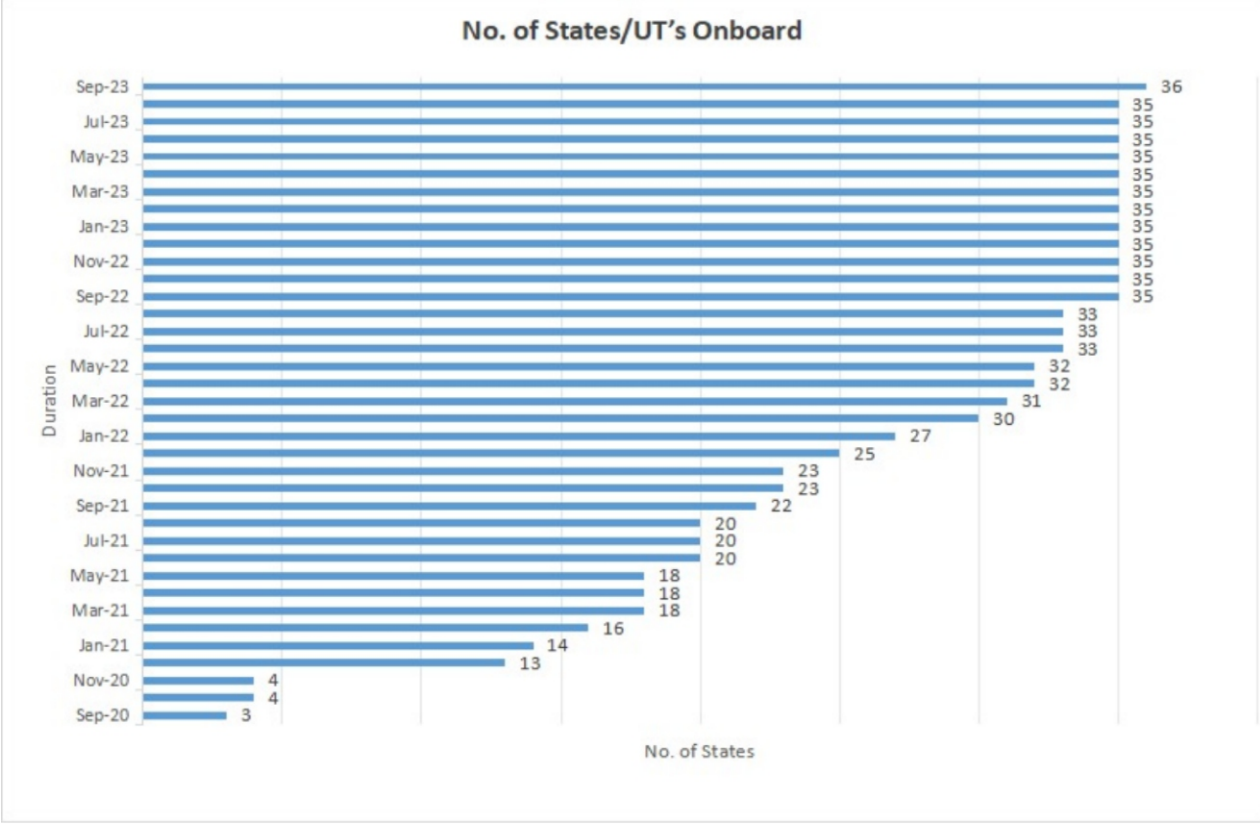


Fig 1: No. of States/UTs on boarded

Factors Contributing to The Launch Of E-Daakhil Portal:

Few of the many factors expediting the launch of e-dakhil portal are listed as under:

- **Impact of pandemic-** India, like the entire world, was hugely impacted by covid in 2019-2020 due to lockdown. The filing and attending of court cases became a practical nightmare because of overcrowded court rooms, quarantine, restrictions in mobility, financial stress due to job loss, limited number of judges, limited hours of court proceedings and crumbling infrastructure. The scenario was no different in consumer commissions, thereby, accentuating the need to adopt e-daakhil portal for delivery of online justice and e-filing of complaints by the consumers.
- **Judicial support-** all Courts across the country were directed by the Supreme Court in the wake of COVID19, to extensively use video conferencing for judicial proceedings as common litigant was suffering due to lack of access to courts and legal services. During the Pandemic the Supreme Court exercised its plenary power under Article 142 of the Constitution to direct all High Courts to frame a mechanism for use of technology. A Standard Operating Procedure

dated April 15, 2020 was issued by the Supreme Court of India for filing and listing of urgent matters and hearing of cases through video conferencing to vanquish the lockdown[4].

- **Adhering to the directions-** Department of consumer affairs jumped into action and in no time adhered to the directions of the Supreme Court and provided support for conducting VC hearings for the limited time period. This has now been made a mandatory practice across the length and breadth of consumer commissions. Department also spearheaded the launch of e-daakhil portal, the technical foundation of which was already laid as early as in the year 2014 in the form of CONFONET.
- **Legislative support-** changes brought about by the Consumer Protection Act, 2019 provided a legislative backing to the launch of e-daakhil portal.
- **Success of CONFONET scheme-** initial success of CONFONET scheme showed a way forward to the Department that even the consumers need not travel miles or have deep down understanding of legal jargon and procedures to seek justice. This prompted Department to launch e-daakhil portal in its present form to fully empower consumers.
- **Payment gateway-** adoption of robust and secure payment gateway for payment of fees for e-filing of complaints because of successful implementation of Digital India initiative and advancement of technology.

Understanding E-Daakhil Portal:

E-Daakhil portal stands tall on 3 basic pillars-

1. **Confonet (https://confonet.nic.in/)**

   The Members and staff of the various Consumer Commissions and Forums can access statistical reports regarding filing, disposal, and pendency of cases at their respective commissions/forums, at ConfoNet portal. In addition, it makes Cause list, Case status, Orders & Judgments and Case History available to the consumers.

2. **E-Daakhil Portal (https://edaakhil.nic.in/)**

   All deprived and aggrieved consumers can access the portal to register consumer complaints online from anywhere in India, pay the charge electronically and track the progress. Any consumer/advocate can register themselves on the eDaakhil software with proper authentication through OTP sent on their registered mobile / activation link sent on registered email-id. Thereafter, they can proceed for filing of complaint.

3. Online Case Monitoring System (Ocms)

The Case Monitoring System provides a single-window solution for automation of all the activities undertaken at the Consumer Forums at the National, State and District Levels. The registration of complaints, recording of court proceedings, issue of notices, generation of cause lists, recording of judgments, record-keeping and generation of statistical reports and all other court related activities are carried out through this standardized software alone. It helps in generating unique file no's, admits virtual hearings and processes and captures orders and judgment details.

Salient Features of E-Daakhil Portal:

- User registration for filing of complaint from anywhere and anytime
- Generation of unique case number
- Online fee payment
- Management of online profile
- Keeping a track of application status
- Managing and viewing the responses received
- Access to written statements and rejoinders
- Receiving SMS/Mail alerts
- 24*7 facility for uploading case related documents
- Integration of e-daakhil with Confonet and OCMS for complete case details
- online videos and tutorials for educating consumers and eliminating middlemen to make the entire process cost-effective and accessible.

Objectives and Deliverables:

- Online payment, filing of consumer complaint from anywhere and anytime
- Grievance redressal for marginalized consumer
- Integration with Common Service Center (CSC)
- Social media awareness and impact
- Transforming consumer journey from being a deprived consumer to becoming a smart consumer using online videos and tutorials
- Saving information from deterioration
- Extending support to go-green and digital India initiative

Working Module Of E-Daakhil Portal:

Complaint Filing at the comfort of your home has now become feasible with the newly launched Edaakhil Application (https://edaakhil.nic.in/edaakhil/faces/index.xhtml). A user, may be a complainant or an advocate can file a complaint online at his/her ease.

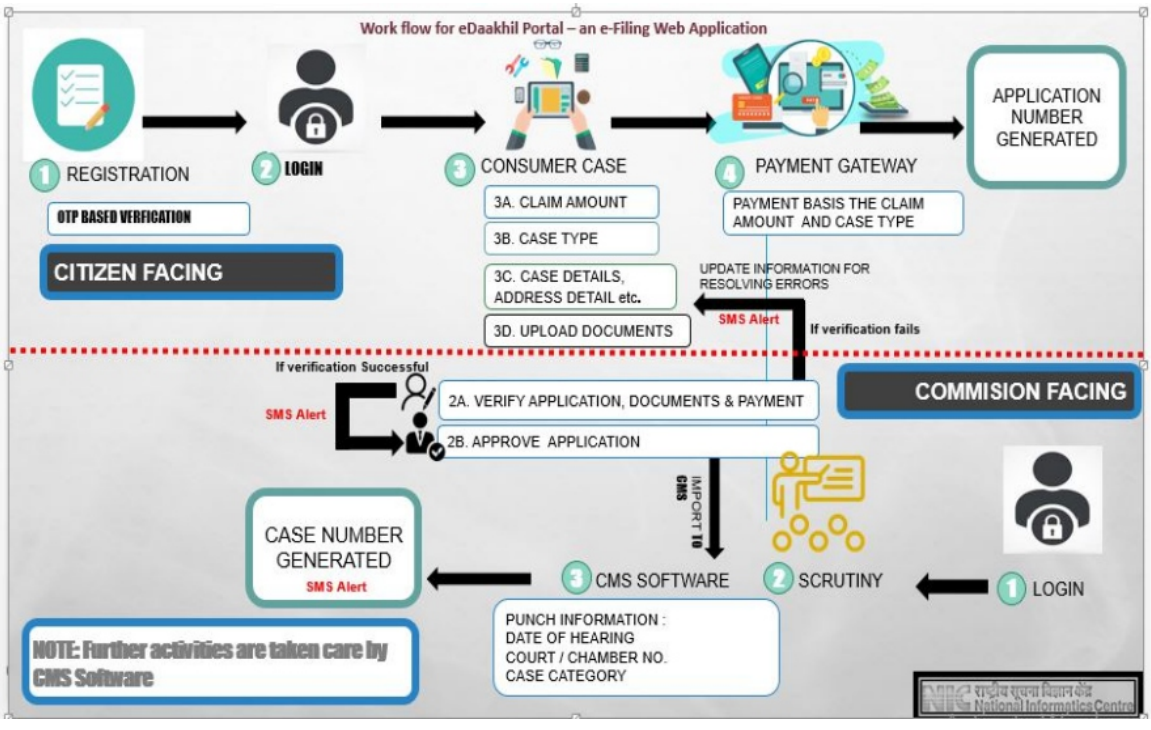


Fig 2: Workflow for e-daakhil portal

Following is the detailed procedure for lodging a consumer complaint on e-daakhil portal:

- Valid Email Id : to get registered on Edaakhil portal
- Soft copies of Identity Proof: Voter Id/ Pan Card/ Passport/ Ration Card/BPL/AAY Card/Driving License
- Document Format should be PDF only.
- An OTP and activation link are sent on email id.
- User account is created

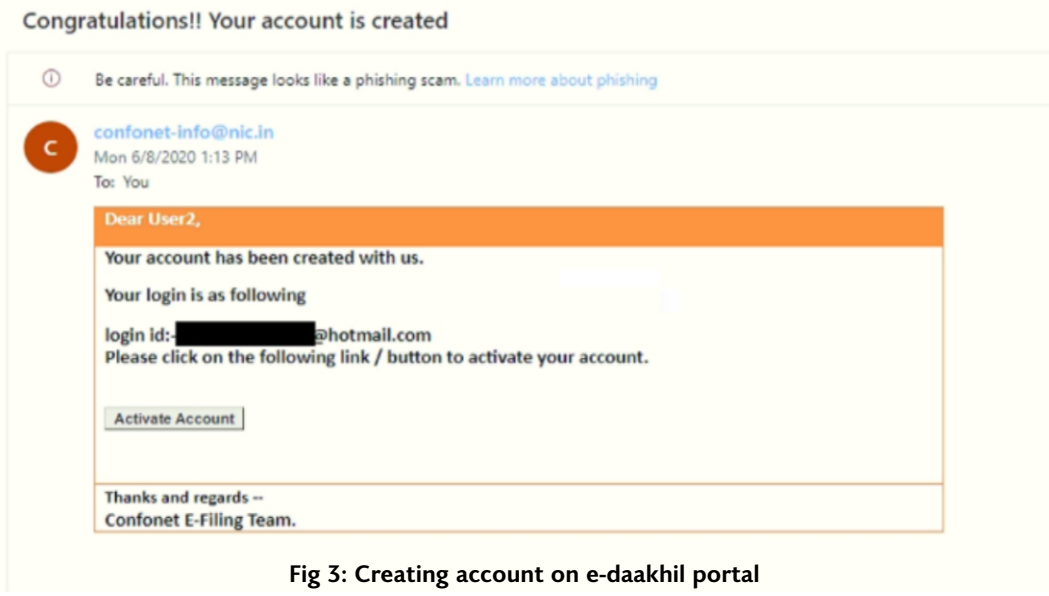


Fig 3: Creating account on e-daakhil portal

- Login with username and password

Fig 4: Consumer forum online application format

- Fill the case details, upload documents and save the application

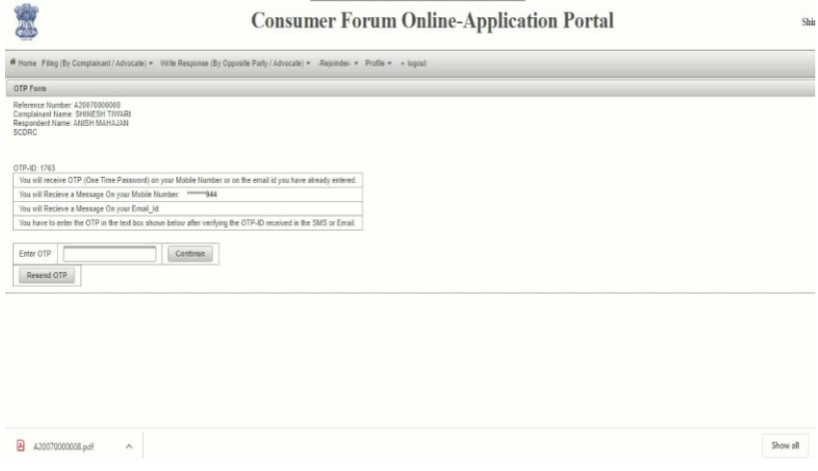


Fig 5: Uploading the documents

- Asks you to make payment either through online or offline mode and shows you the status of cases filed by you

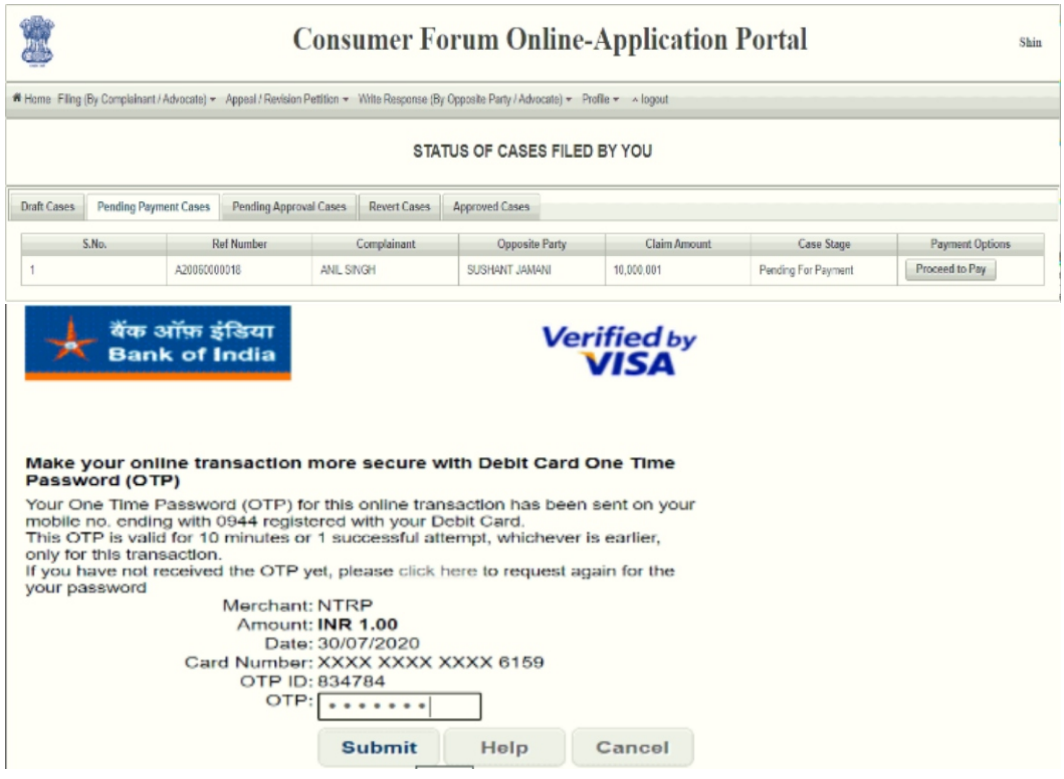


Fig 6: Making payment through portal

- It also allows you to file consumer application, revision petition, first appeal or a rejoinder in/of the existing case following a similar procedure

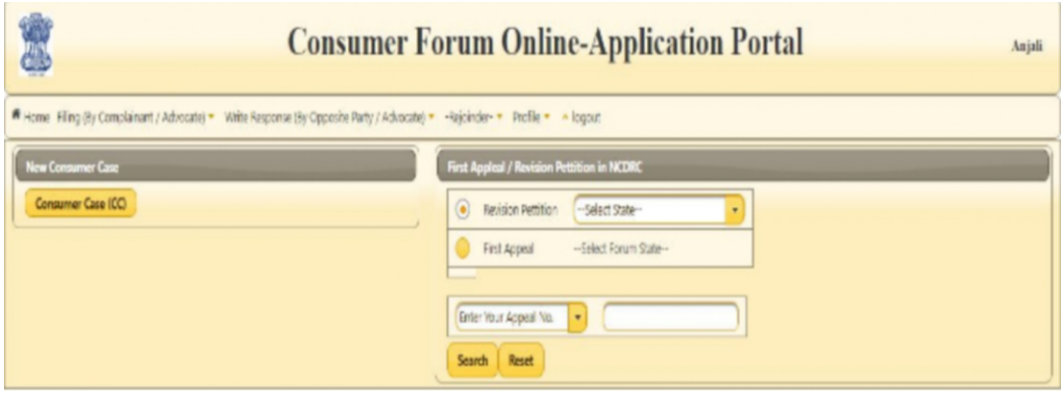


Fig 7: Filing of Revision Petition

Fig 8: Filing of Rejoinder

- In addition, provides access to Written Statement filed by the opposite party

Major Milestones:

E-daakhil portal has been hugely accepted by consumers as a progressive endeavor of the Department and majority of the consumers have shifted to the portal for e-filing of complaints. This has become possible because of the efforts of Department by making e-daakhil portal more visible through its consumer outreach programmes and social media and awareness initiatives. Also, the initiatives such as organizing of Lok Adalats across the commissions and introduction of VC facility in NCDRC and gradual onboarding of state and district commissions has not only reduced the pendency of cases but has also given a positive flip to the justice delivery to consumers through e-daakhil portal.

Complaints Filed Across States/UTs:

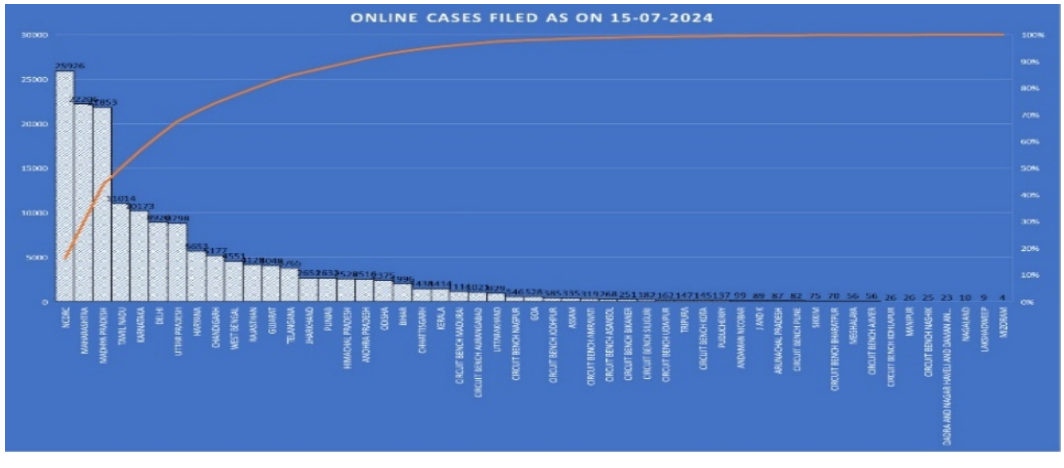


Fig 9: No. of Complaints filed across states/UTs

The data reflects the variation in number of complaints filed across different states/UTs with states like Tamil Nadu, Karnataka performing comparatively well in comparison to North Eastern States. NCDRC has seen a growth of almost 80% in number of cases being filed by consumers.

Users Registered On E-Daakhil:

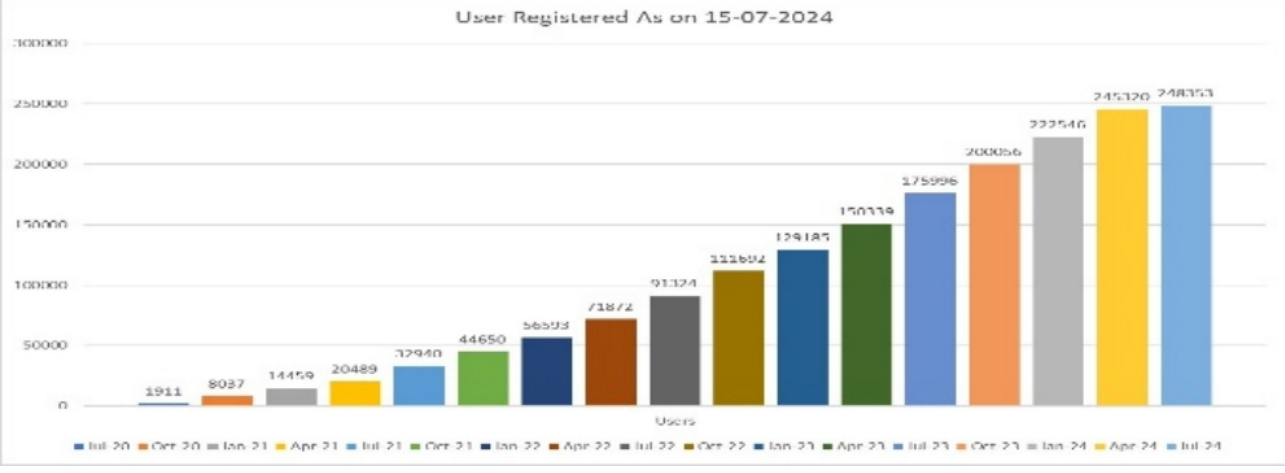


Fig 10: No. of registered users on e-daakhil portal

A steep increase in no. of registered users on e-daakhil portal has been observed from year 2020 to 2024 and this number is still rising. This data indicates the awareness level amongst consumers and reflects the effectiveness of e-daakhil portal in capturing consumer faith in the system.

Overall Status from The Year 2020 To 2024:

Weekly report on cases filed on e-Daakhil portal					
As on Date	Registered Users (a)	Cases Filed (b)	Cases Admitted (c)	Cases Disposed (d)	Cases Pending (e) = (c) - (d)
07-09-2020 to 11-07-2024	247,543	160,101	96,785	26,414	70,371

Fig 11: Overall data of cases filed, admitted and disposed

The comparative analysis shows that an increasing number of users are getting registered on e-daakhil portal with decent number of complaints getting admitted and disposed off.

INCREASE IN NO. OF CASES FILED FROM 2020 to 2024:

Year	Online Filed Cases
2020	1353
2021	10029
2022	22324
2023	70332
2024	57018
Total	**161056**

Fig 12: Total no. of cases filed from 2020 to 2024

Where the number of overall cases filed in 2020 were only 1353, this number has risen to 57018 in the year 2024 across all commissions. Thus, the total number of cases filed until 2024 is 161056 with figure in the preceding para showing the number of cases successfully disposed of.

Consumer Success Stories:

The consumer stories on e-daakhil portal have been diverse and interesting. E-daakhil portal not only provided online service to the consumers but it has empowered consumers in different ways, transgressing all the geographical barriers. On one hand, the portal has strived to deliver justice in far reaching rural and remote areas/districts of states like Uttar Pradesh, Bihar and on other hand, it has made the entire process consumer inclusive by catering to consumers of Northern Eastern states as well. More and more no. of consumers is coming forward to file complaints because of increased faith in the system and seamless resolution of their complaints. Some of the interesting cases resolved through e-daakhil portal are discussed below.

District Commission, Ranga Reddy, Telangana

Facts:

Consumer had availed service of making modular kitchen by paying Rs. 2,75,000/-. Service provider had promised that it will take 10 days to prepare the wood work and then dismantled the existing

kitchen wood work, thereafter it will take 5 more days to set up the new modular kitchen work. But, service provider failed to complete the work as promised in quality and time and because of which it was difficult for consumer to carry out daily chores and cooking owing to the dismantied kitchen. Consumer's kitchen was dismantled on 23.06.2021 and till 30.07.2021 no new wood work had been done. Consumer sent a legal notice however, service provider refused to accept the same.

Process:

The Consumer filed complaint through e-daakhil against service provider for deficiency in service on 07.10.2021 which was registered and heard by the commission and judgment was given in favor of the consumer within two months.

Relief:

Consumer Commission passed order for refund of Rs.2,70,000/- with interest @ 6% p.a. from the date of filing complaint i.e. 07.10.2021 till the date of realization along with compensation of Rs.30,000/- for the mental agony and financial hardship caused to the consumer and further Rs.5,000/- as cost since service provider constrained the consumer to approach the Commission for redressal.

Consumer Commission, Dumka:

Facts:

The consumer ordered a watch worth Rs.1650 with Rs.99 as shipping cost, which he got at the discount of 8% on Rs.1609 on 30.04.2022, but afterwards, he noticed it was a copy of an international brand, and it's illegal, so he cancelled his order within an hour and informed the respondent about the same. After no response, he registered a complaint and after three days respondent shipped him the product and was forced to take this product, but no refund was provided. He tried to contact the respondent many times but didn't get any answer.

Process:

This consumer lodged an online E-Daakhil Complaint on 11.06.2022, which was registered and heard by the consumer commission and disposed off within one month and eleven days.

Relief:

The respondent refunded the whole amount to the consumer, so the case was dismissed on 23.07.2022.

District Commission, Ferozabad:

Facts:

The complainant enrolled his son in the coaching institute (Respondent) for batches starting from the end of January 2020. Respondent asked for the fees for a course from December and took Rs.l, 45,000/-. Suddenly 50+ best faculties of Respondent had left the institute, including the complainant's son's teachers also, and then their teaching level was dropped, and he was not satisfied with their services. He applied for a refund on 13.02.2020, and they gave him a slip of Rs |, 10,160/~ and deducted Rs.34 840 and gave him the study material. He had communicated with them several times since March 2020, but they made excuses, and even some officials have switched off their phones and changed their numbers.

Process:

This complainant lodged an online E-Daakhil Complaint on 05.04.2021, which was registered and heard by the consumer commission, and judgment was awarded in favor of the complainant in five months and nine days.

Relief:

Hon'ble Justice, President, Consumer Commission ordered a refund of Rs l,10,160/~ with 6% interest from 13.02.2020 till the date of refund and Rs.2000 for Compensation on 14.09.2021. The complainant has received the amount.

District Commission, Mainpuri:

Facts:

Consumer on 20.3.2020 brought Motor Cycle Honda C.B. Shine worth Rs.80,000/- from Dharmender Auto Sales. The cost Rs.80,000/- was including the bike cost, Motor Vehicle insurance, and Vehicle Registration Cost. The consumer received the bike on the date of payment but the insurance papers and Registration certificate were asked to be collected one month after. After one month the consumer received the insurance registration papers but the dealer refused to give the Vehicle Registration number. The consumer went many times to the dealer to receive the Registration Certificate but the dealer refused to do so. Even consumer through its advocate send legal notice dated 13.01.2021 to the dealer to which no reply and even no registration certificate was provided by the dealer.

Process:

This consumer lodged the E-Daakhil consumer complaint on 16.02.2021 which was registered and heard by the consumer commission and the judgment was awarded in the favor of consumer within 6 months, reducing physical movement and presence of the consumer in the commission.

Relief:

The consumer commission ordered that the automobile dealer was directed to give within one month the Vehicle Registration number to the consumer along with the fine of Rsl1000/- in favor of the consumer.

District Commission, UT, Andaman & Nicobar Island at Port Blair:

Facts:

Consumer has purchased a flight ticket for Rs. 20, 162/- on 07.08.2019 from the opposite party Spice jet through debit card of Union Bank of India at Spice jet counter at Veer Savarkar International Airport, Port Blair. The flight was re-scheduled by the airline and consumer was eligible for full refund as per the cancellation policy. The airlines informed consumer that refund has been processed which will be reflected in the account of the consumer within 7-10 days. However, the consumer did not receive any refund.

Process:

The consumer lodged an online E-Daakhil complaint on 12-01-2021 which was registered and heard by the district consumer commission and Judgment was awarded in favor of Complainant.

Relief:

The Consumer Commission through the President Bijoyesh Ghosal Order dated 05.04.2022 directed to pay total amount of Rs. 31662/- (Rs. 20,62/- +10,000/- + 1,500/) with 5% interest from the date of filing of the complaint.

Vision and Scope of Improvement:

As discussed already, the whole sole of e-daakhil portal is to make life of consumers easy by delivering justice through online medium. Today's consumer is aware, tech-savvy and eager to invest in online resources. But as much as consumer is technology driven, consumer is limited by paucity of time. Here comes the role of Department to enable consumers to vouch for their rights from the comforts of their homes and from the limited time and resources they have at their disposal. Department endeavors to take its project of e-daakhil portal to new heights by introducing novel features, some of which are discussed below:

- Single integrated platform **"e-Jagriti"** by unifying E-daakhil, Confonet and OCMS portals to provide single gateway for all stakeholders.
- To make the process of e-filing easy and seamless with minimal steps, faceless onboarding and AI based conversational support to the consumers
- To make issuing of alerts at each level possible across the commissions
- Micro monitoring of SLAs
- Providing virtual hearing options- anytime and anywhere across all commissions
- Voice enabled service for specially challenged and differently abled people
- Adoption of AI/ML for documentation, analysis, prediction etc.
- Role Based Access Control (RBAC) for all stakeholders including Consumer Commission Officials, Judges, Advocates, Industry experts, Mediators etc.
- Enabling Text to Speech and Speech to Text feature
- Making payment gateway seamless and secure
- Voice bot/Chat bot for * assisting aggrieved consumers on e-daakhil portal
- Providing multi-lingual support at each level
- Populating judgment/similar case search across country
- Creating a lawyer's forum for making segment/category-based information available

Acknowledgement:

Shri G. Mayil Muthu Kumaran, Deputy Director General NIC and his team for guiding us in designing the system and providing us insightful resources for writing this research paper.

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CHAPTER 6

Bhu Aadhar or Unique Land Parcel Identification Number (ULPIN)

Authors:

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2. **Shri Kunal Satyarthi IFS,** Joint Secretary, Department of Land Resources
3. **Shri Sarvadanand Barnwal ISS,** Director, DoLR
4. **Shri Mayank Rajput,** Coordinator Geospatial, DoLR

Abstract:

The Bhu-Aadhar or Unique Land Parcel Identification Number (ULPIN) is a 14 digits alpha-numeric ID generated based on the geo-coordinates of the vertices of each land parcel. A novel system designed to address the challenges associated with unambiguous identification and precise mapping of land parcels. In many countries, the lack of a standardized and unique identification mechanism for land parcels hampers effective land administration and management. The ULPIN aims to overcome these obstacles by providing a comprehensive framework for assigning a distinct and persistent identification number to each individual land parcel. This paper presents an in-depth analysis of the ULPIN system, highlighting its key components and operational processes. The ULPIN framework leverages state-of-the-art technologies such as Geographic Information Systems (GIS) and remote sensing to ensure accuracy, security, and reliability of land parcel identification. By integrating various data sources and utilizing advanced spatial algorithms, the ULPIN system enables seamless integration of land information across multiple jurisdictions and facilitates efficient land governance. Furthermore, this paper discusses the potential benefits of implementing the ULPIN system, including enhanced land administration efficiency, improved property rights protection, streamlined land transactions, and increased transparency in land management. The paper also addresses the challenges associated with ULPIN implementation, such as data standardization, interagency coordination, and legal considerations.

In conclusion, the Bhu-Aadhar or Unique Land Parcel Identification Number (ULPIN) represents a significant step forward in land

administration systems, offering a standardized and unique identification mechanism for land parcels. The ULPIN system has the potential to revolutionize land management practices, improve governance, and promote sustainable development.

Keywords: Bhu Aadhar, ULPIN, Land Parcel, GIS, Land Administration

VISION

The Unique Land Parcel Identification Number (ULPIN) or Bhu-Aadhar shall be a Single, Authoritative Source of Truth of information on any parcel of land or property to provide Integrated Land Services to the citizens as well as all stakeholders.

Mission

i. Identify departments which provide land related services

ii. Identify services of these land departments

iii. Assign a unique Id to each parcel

iv. Set up a federated Land information system which works in collaborative manner

Digital India Land Records Modernization Programme (Dilrmp) And Unique Land Parcel Identification Number (Ulpin Or Bhu-Aadhar)

The National Land Record Modernization Programme (NLRMP) was approved by the Cabinet on 21.8.2008 as a Centrally Sponsored Scheme and later revamped under the Digital India initiative and renamed as Digital India Land Records Modernization Programme (DILRMP) and is being implemented as a Central Sector Scheme with effect from 1st April, 2016 with 100% funding by the Centre. The programme has been extended up to 2021-22 to 2025-26 with an outlay of Rs.875 crore.

Objectives of Bhu-Aadhar Or Ulpin

The finer goals and objectives of the proposed system would be:

i. To Work out a strategy and develop a system to assign Unique ID for each Land parcel by the respective States/UTs

ii. To create an online Land Information System with open standards APIs (Application Programming Interface) that is based on GIS and OGC compliant so that other stakeholders could use them online to generate further value.

iii. To provide comprehensive information on land and properties, consisting of textual and spatial data

iv. To maintain the consistency of core data across all departments and agencies of the Government countrywide

Approach/ Methodology

I. Board of Revenue/Department of Revenue and like concerned departments of the States/UTs is to take lead initiative

ii. Identify all departments dealing with Land Resources

iii. List the services being rendered by these departments/agencies single-handedly or multi-departmentally in a collaborative manner.

iv. Identify common data sets being maintained by these Departments about Land Resources, Ownership etc from database schema used by departmental e-Applications

v. Standardise common data attributes

vi. Strategy for assigning Unique ID for each Land Parcel can be worked out based on the following situations:

a. Where Land has Geo-Referenced Lat/Long Coordinates:

I There is a formula to generate and assign ECCMA Standard prescribed Unique 14-digit Unique ID (PNIU) using the parcel Geo Referenced coordinate of vertices

ii This computationally generated Unique ID, would be organically dependent on Parcel vertices expressed in Lat/Long coordinates (PNIL)#and Unique ID(PNIU)## would spatially be pointing to the surface of the parcel.

iii A new Unique ID would be generated by the System itself as and when mutation takes place as Lat/Long of Mutated Parcel would be different.

iv This Unique ID of Parcel, being very precise & accurate, should not be shared in Public domain due to their strategic and accurate locational & security values and hence may be mapped with another Unique random number with prefix state code, which can be shared with Owner and in public domain for all practical purposes.

However, sharing of the Unique ID with the land owners or keeping it in public domain before mapping it to another Unique random number with prefix State code is in the purview of the respective State Revenue Departments of the States/UTs as the ownership of the land records data is vested in the respective Revenue Departments of the States/UTs Administration.

Property Natural Identifier Lot (PNIL#): The modern survey equipment and technologies has made the geospatial representation of boundaries and features commonplace in everything from websites to mobile devices. It is technically feasible to translate the coordinates of a polygon representing a property boundary into a string in such a way that the string can be resolved back to the polygon within the Earth coordinate system

Property Natural Identifier Unit (PNIU#): A globally unique identifier. It is created through the application of a reversible algorithm to the position and elevation of the midpoint of the plane representing the primary point of entry to a legally delineated unit space within a building. It is natural as it can be derived from the characteristics of the property, without relying on a third party such as a central property registry, to mint and manage IDs.]

b Where presently Land Parcels do not have Geo Referenced Coordinates:

I. There are many States which have assigned Unique IDs to Land Parcels that are composite in nature and dependent on Administrative Unit codes such as District code, Tehsil Code, Village code etc.

Such codes face issues e.g. in case of reorganisation of boundaries that is quite a common practice now though it can be managed from the IT angle

ii. State of Andhra Pradesh adapted a strategy and assigned random code to each land parcel with first two digits for State code. This would remain unaffected during delimitation of boundaries of administrative units.

Would change only when mutation happens

iii. State of Uttar Pradesh adapted another strategy and assigned16 digit unique code for each land parcel as First 6 digits is revenue village code, 7th digit to 10th digit is Bhukand Ghata code (Plot No.), 11th digit to 14th digit is subdivision number (bata, ka, kha, gha, min jumla), 15th and 16th digit for land type.

Value Proposition:

I. The Single source of truth on Land will stand as authoritative reference to authenticate the ownership and the other land parameters of the record

ii. Unique Categorization of Govt Lands would benefit in instant identification and prevention of transfer of such lands to individuals during transactions such as Registration

iii. A Unified ID (viz., uniformity in assignment like Aadhaar number) would in future lead to Certificate-less governance

iv. Standardization at Data and Application level would bring in effective integration and interoperability across Departments and other Stakeholders/ Service Providers

v. Assigning UniqueID to each Land Parcel in State, irrespective of the Department dealing with land, would help Unified system to track the Land, its reconciliation etc and to bring higher values to all stakeholders

Case Studies

NIC has taken up case studies in:

I. Bihar-The geo-referenced cadastral map data of Saidpur revenue village-Katrisarai revenue circle-Rajgir subdivision-Nalanda district were taken as a case study to test the concept.

ii. Haryana-The geo-referenced cadastral map data of Sirsi village of Karnal District was taken for study.

Challenges /Gaps:

Lack of geo-referencing of cadastral maps / land parcels by the States / UTs is a major issue and challenges in rolling out and expansion of ULPIN or Bhu-Aadhar.

Benefits Include:

I. Unique Number across country, No duplicity

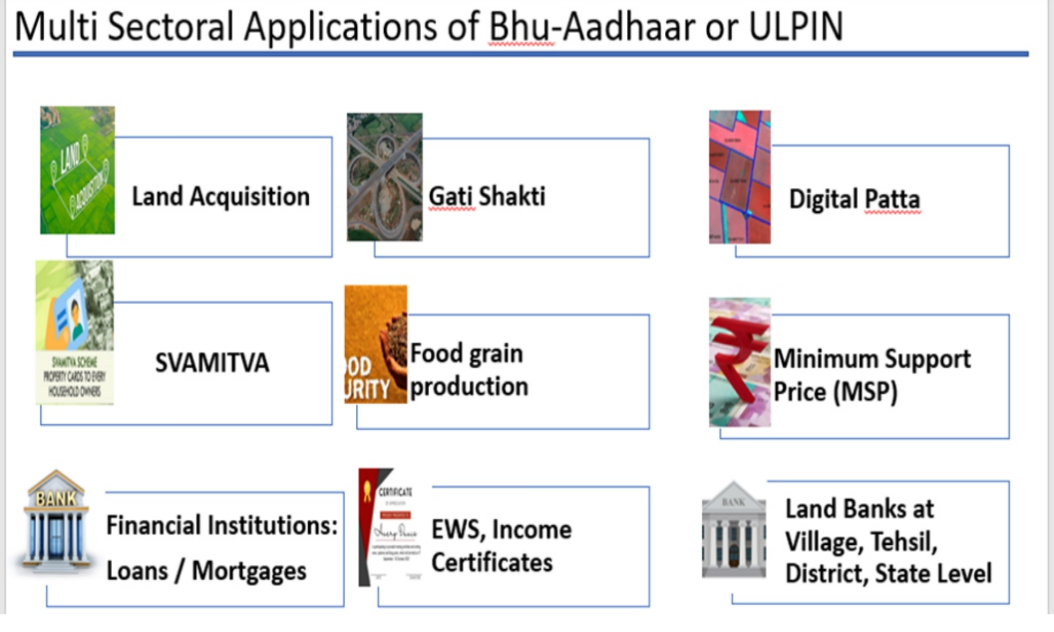
ii. Cross validation and Auto Updation of Land related information across sectors

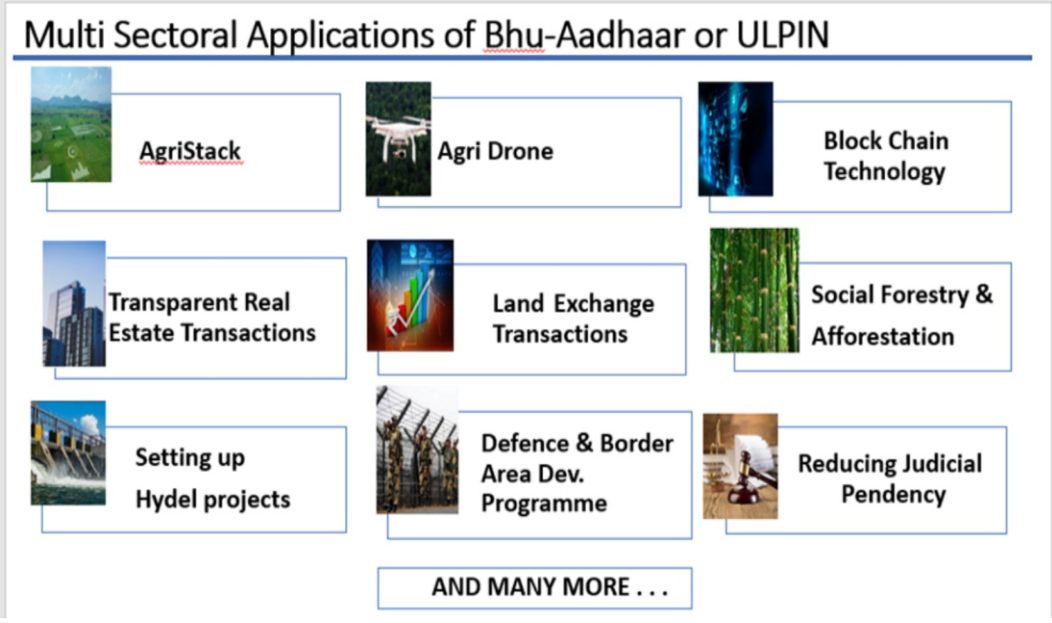
iii. Establishes farmer – land relationship authoritatively

iv. Single window service delivery – ULPIN can be used any kind of services where land record is required,

v. Enforces uniqueness of all transactions

vi. Link of all property transactions gets established



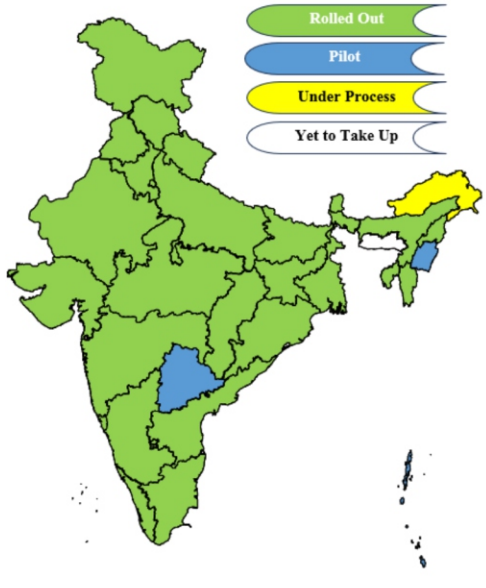


Status of Implementation:

The status of implementation of ULPIN as on 20th July, 2024, was that it had been adopted in 29 States / UTs namely; Andhra Pradesh, Jharkhand, Goa, Bihar, Odisha, Sikkim, Gujarat, Maharashtra, Rajasthan, Haryana, Tripura, Chhattisgarh, Jammu & Kashmir, Assam, Madhya Pradesh, Nagaland, Mizoram, Tamil Nadu, Punjab, Dadra and Nagar Haveli & Daman and Diu, Himachal Pradesh, West Bengal, Uttar Pradesh, Uttarakhand, Kerala, Ladakh Chandigarh, Karnataka and Delhi.

Further, pilot testing has been done in 4 States / UTs namely; Puducherry, Andaman & Nicobar, Manipur, Telangana, and work is in progress in 1 States / UTs namely; Arunachal Pradesh.

Status	States/UTs	Total Nos.
Rolled Out	Andhra Pradesh, Jharkhand, Goa, Bihar, Odisha, Sikkim, Gujarat, Maharashtra, Rajasthan, Haryana, Tripura, Chhattisgarh, Jammu & Kashmir, Assam, Madhya Pradesh, Nagaland, Mizoram, Tamil Nadu, Punjab, Dadra and Nagar Haveli & Daman and Diu, Himachal Pradesh, West Bengal, Uttar Pradesh, Uttarakhand, Kerala, Ladakh Chandigarh, Karnataka and Delhi	29
Pilot	Puducherry, Andaman & Nicobar, Manipur, Telangana,	4
Under Process	Arunachal Pradesh	1
Yet to Take Up	Lakshadweep & Meghalaya	2



Conclusion:

The Proposed approach/ methodology to build an Integrated Land Information and Management system (ILIMS) is expected to provide quality services to users through single portal on one hand and achieve transparency in land transactions. The Architecture shall be generic enough to include more department/agencies as and when they become a stakeholder as per criteria. Department of Land Resources (DoLR) in collaboration with NIC may take pilot project in the States/UTs that are at advanced stage of digitization of land records (cadastral maps) with geo-referenced coordinates in consultation with them to generate Unique ID. After successful implementation of pilot, State/UTs as per their preparedness may approach NIC team/other agencies to roll out the system in their respective States/UTs.

For implementation of ULPIN, administrative and financial support shall be extended by DoLR according to guidelines of DILRMP and technical support for roll out the system will be facilitated by NIC, Survey of India, Department of Science and Technology and National Remote sensing centre.

Acknowledgement:

We would like to express our deepest appreciation to Hon'ble Union Minister of Rural Development & Panchayati, Hon'ble Ministers of State for Rural Development who have encouraged the team to design, develop and implement the Bhu Aadhar or ULPIN, an innovative solution for Land Governance in the Nation.

It is the inspiring leadership of Shri H.S. Meena, (IAS Retd.), Former Add. Secretary DoLR, and officers of DoLR, NIC and DST led to conceptualization and implementation of ULPIN with active participation of States and UTs. Above all we would like to express our gratitude to almighty for blessing us sound health, abilities and giving us courage throughout this journey to complete our implementation work successfully towards service to the Nation.

CHAPTER 7

Shaping Service Delivery for Tomorrow

Authors:

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Abstract:

In an increasingly interconnected world, the landscape of service delivery is rapidly evolving, presenting both challenges and opportunities for public administrators. This research delves into strategies to shape service delivery for future sustainability and effectiveness within bureaucratic frameworks. By synthesizing current literature and empirical evidence, the study identifies pivotal trends such as digital transformation, citizen-centric approaches, and agile governance as essential drivers of change. Through a qualitative analysis incorporating case studies and expert interviews, the paper explores how bureaucratic institutions are adapting their service delivery models to meet evolving citizen expectations and technological advancements. The findings underscore the significance of leveraging digital innovations not only to streamline administrative processes but also to enhance service accessibility and responsiveness. Moreover, the research highlights the importance of fostering a culture of innovation and collaboration within bureaucracies to foster continuous improvement in service delivery. Ultimately, this paper aims to provide actionable insights for public administrators navigating the complexities of delivering effective and citizen-centric services in the future.

Introduction:

The Auto Appeal System (AAS) introduced by the state of Haryana marks a significant innovation in administrative justice and citizen engagement within the realm of public service delivery. Designed to streamline and expedite the appeals process for various administrative grievances, the AAS leverages digital technologies to enhance accessibility, transparency, and efficiency. This research paper aims to explore the implementation, impact, and effectiveness of the AAS in Haryana.

The introduction of AAS represents a paradigm shift towards leveraging technology to address longstanding challenges in the appeals process, such as delays, procedural complexities, and

accessibility barriers. By automating and digitizing key aspects of the appeals procedure, the system not only aims to reduce bureaucratic hurdles but also seeks to empower citizens by providing a user-friendly interface to lodge appeals and track their status in real-time.

This paper will delve into the foundational principles and objectives behind the AAS, examining how it aligns with broader initiatives of e-governance and administrative reform in Haryana. Furthermore, it will analyse empirical data and case studies to evaluate the system's impact on enhancing administrative efficiency, improving citizen satisfaction, and promoting accountability within the state's governance framework.

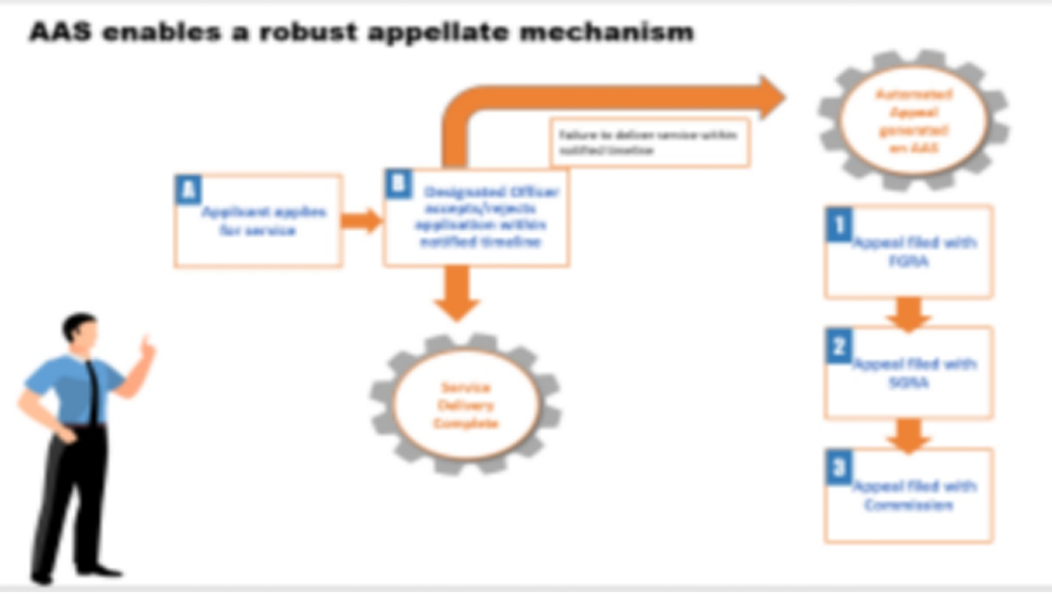
Auto Appeal System (AAS)

2.1 Genesis and working of AAS

The Haryana Right to Service Act came into being on March 26, 2014, with the objective of establishing a robust framework of accountability and transparency. This framework ensures that various government departments operating within the state of Haryana deliver services within specified timeframes. Under this Act, the Designated Officer (DO) is held accountable for ensuring timely service delivery as mandated. The Act includes a three-tier appellate mechanism, allowing eligible individuals who have applied for services but have not received them within the stipulated timeframes to approach these appellate authorities.

However, even a well-drafted Act cannot achieve significant improvements without effective implementation and user-friendliness. Initially, the process of filing appeals under the Act was cumbersome for service seekers, resulting in only seven appeals being filed in seven years before June 21, 2021. This number is significantly low considering that over 7 million services were delivered outside the RTS timeline during the same period. Several factors contributed to this low appeal rate, including lack of public awareness, inconvenient filing procedures, and the absence of an IT-enabled platform for appeals.

These challenges underscored the need for a user-friendly mechanism to facilitate appeal filing and ensure the Act's effectiveness in benefiting service seekers, rather than remaining merely a symbolic legislation on paper. Recognizing this need, the Auto Appeal System was launched on September 1, 2021, by the then Honourable Chief Minister of Haryana. This system provides a robust mechanism for automatic filing of appeals. Importantly, any eligible person who applies for a designated service in Haryana can file an appeal in cases of wrongful rejection or unsatisfactory service delivery. Additionally, an automatic appeal is initiated to the first appellate authority in cases where the Designated Officer fails to act. This initiative aims to streamline the appeals process, making it more accessible and efficient, thereby ensuring that the Haryana Right to Service Act fulfils its intended purpose of improving service delivery for citizens. A detailed appellate mechanism for AAS has been illustrated in Fig. 1.



2.2 Salient Features of AAS

A. Automatic escalation of appeals to the First Grievance Redressal Authority in the event of RTS timeline breach:

- This means that if a government department (mainly Designated Officer) fails to deliver a service within the stipulated time as per the Right to Service (RTS) Act, the appeal is automatically escalated to the First Grievance Redressal Authority. This ensures timely attention to unresolved service requests.

B. Facility to file appeals to appellate authority in case of: • Unjustified rejection (within RTS timeline): If a service request is rejected without valid reasons within the RTS timeline, the applicant can file an appeal.

- Unsatisfactory service delivery: If the service provided does not meet the expected standards, an appeal can be filed.
- Unsatisfactory resolution of appeals: If the initial appeal is not satisfactorily resolved, further appeals can be filed to address the issue.

C. Service seekers can file appeals on the 'Saral' portal themselves or by simply dialling the 'Saral' helpline number:

- This provides two convenient methods for service seekers to lodge appeals. They can either use the 'Saral' portal online or dial the 'Saral' helpline number for assistance in filing their appeals. The link to file an appeal is provided in the same SMS which is sent after completion of service.

D. Public dashboard which precisely shows the appeal data of all departments:

- AAS dashboard offers transparency by displaying detailed data related to appeals filed across all government departments. It allows the public to monitor the status and trends of appeals, promoting accountability and awareness.

E. Intimation through SMS to the appellant and appellate authority:

- Upon filing an appeal, both the appellant (the person filing the appeal) and the appellate authority (the authority responsible for reviewing appeals) receive notifications via SMS. This ensures timely communication and acknowledgment of appeal submissions.

F. A robust feedback mechanism:

- This mechanism allows appellants and other stakeholders to provide feedback on the appeal process. Feedback helps identify areas for improvement and ensures continuous enhancement of the appeals system.

G. Provision of conducting hearing, issuing directions and final orders in the digital mode:

- All proceedings related to appeals, including hearings, issuance of directions, and final orders, are conducted digitally. This promotes efficiency, reduces paperwork, and facilitates quicker resolution of appeals.

H. Viewing of original application submitted by the appellant in case of application being submitted on Antyodaya Saral portal:

- For services applied through the Antyodaya Saral portal, the appellate authority has the capability to view the original application submitted by the appellant. This ensures that all relevant information is accessible during the appeals process.

These points collectively highlight the comprehensive framework and features designed to streamline the appeal process under the Haryana Right to Service Act, ensuring transparency, efficiency, and accessibility for service seekers and stakeholders.

The state of Haryana has been making a headway towards easing the process of submitting applications for various services and schemes. In this attempt, Antyodaya SARAL has been Haryana's one-stop platform for various services and schemes. Further, as per specific requirements of the departments, they have also created their own portals while some are managed at the level of central government for example Vahaan and Sarathi are two portals managed at the national level. However, for the ease of monitoring, these have been integrated with the Antyodaya Saral portal wherein certain specific data for example Application Submission date, RTS due Date, File Reference ID, Last Action Date, Remarks, etc are reflected on the tracking feature of the AAS portal. There are around 35 such portals developed and maintained either at the national level or at the state level in Haryana. It is pertinent to mention that for increased accessibility, there are 14,480 Common Service.

Centres (CSC) centres across the state offering the last mile to availability of services/schemes to citizens. The CSCs are managed by a district level manager also known as the e District Manager, while the nodal officer for the same is Additional Deputy Commissioner-cum-DCRIO at the district level.

Effectiveness of the AAS Portal: Key Statistics (as on July 21, 2024)

Since its launch in September 2021, the AAS portal has significantly impacted the appeal process under the Haryana Right to Service Act. Here are the latest statistics highlighting its effectiveness:

- Total appeals raised: 13,04,088
- Total appeals disposed of: 12,82,770 (98.4%)
- Appeals raised with First Grievance Redressal Authority (FGRA): 11,63,765
- Appeals raised with Second Grievance Redressal Authority (SGRA): 1,37,938
- Appeals raised to the Commission: 2,385 This highlights a remarkable increase in appeal activity since the introduction of the AAS portal, reflecting enhanced accessibility and effectiveness in addressing grievances.

It is important to note that the numbers mentioned have not been achieved overnight; rather, the Commission has put in significant effort to reach these outcomes. The Commission has issued approximately 200 notices under Section 17(1) (d) of the Act to various IAS officers, IPS officers (including the state DGP), the Principal Chief Conservator of Forests, and around 150 notices to officers from the State Civil Services. Without the Commission's decisive actions, the volume of appeals could have surged from the FGRA to the SGRA, and eventually to the Commission. This would have overwhelmed the Commission and turned it into another grievance redressal forum with numerous pending appeals. To ensure the Commission remains effective and focused on delivering smooth service, it was crucial to keep the number of appeals reaching its level to a minimum. The Commission has successfully achieved this goal, as evidenced by the fact that only 0.2% of appeals raised to the FGRA escalated to the Commission. These figures highlight the portal's effectiveness in facilitating the filing and resolution of appeals, thereby streamlining the grievance redressal process for citizens.

Here are some additional observations on the statistics regarding the effectiveness of the AAS portal:

a. **Significant Increase in Appeal Activity:** The AAS portal has seen a substantial rise in the number of appeals filed compared to the period before its launch. Prior to September 2021, only 7 appeals were lodged with the Haryana Right to Service Commission over a span of 7 years. In

contrast, the portal has handled over 13 lakh appeals within a much shorter timeframe, indicating a marked improvement in citizen engagement and utilization of grievance redressal mechanisms.

b. **Enhanced Accessibility:** The surge in appeal numbers suggests that the AAS portal has successfully lowered barriers to filing appeals. By providing user friendly online access and a helpline option, it has empowered citizens to seek redressal for service delivery issues promptly and efficiently.

c. **Efficient Disposal Rate:** Out of the total appeals raised, a significant majority 12,82,770 have already been disposed of. This high disposal rate indicates that the grievance redressal system supported by the AAS portal is not only effective in processing appeals but also in providing timely resolutions to citizens' concerns.

d. **Role of Grievance Redressal Authorities:** The statistics show that a large number of appeals 11,63,765 were escalated to the First Grievance Redressal Authority (FGRA), emphasizing its pivotal role in addressing service delivery lapses. Additionally, 1,37,938 appeals were escalated to the Second Grievance Redressal Authority (SGRA), underscoring the hierarchical structure of the redressal system set up under the AAS portal.

e. **Appeals to Higher Authorities:** A notable number of appeals 2,385 were raised to the Commission, indicating instances where service delivery issues required intervention at a higher administrative level beyond the local grievance redressal authorities.

f. **Continuous Monitoring and Feedback:** The availability of detailed statistics through a public dashboard enhances transparency and accountability. This allows stakeholders to monitor the effectiveness of the AAS portal in real-time and provides valuable insights for continuous improvement of the grievance redressal framework.

Overall, these observations illustrate how the AAS portal has transformed the grievance redressal landscape in Haryana, making it more responsive, accessible, and accountable to the needs of citizens.

Utilizing the AAS Dashboard for Enhanced Service Delivery Analysis and Reporting

The AAS dashboard provides insights into various trends, enabling in-depth analysis of available data to enhance service delivery. It supports the generation of diverse reports that departments can utilize to refine their service delivery mechanisms. This capability not only facilitates informed decision-making but also fosters continuous improvement in how services are rendered to citizens. By leveraging these analytical tools, departments can identify areas for optimization and implement targeted strategies to better meet the needs of the public. The various types of graphs available on the dashboard are:

a. District wise appeals/ revisions [Fig. 2]

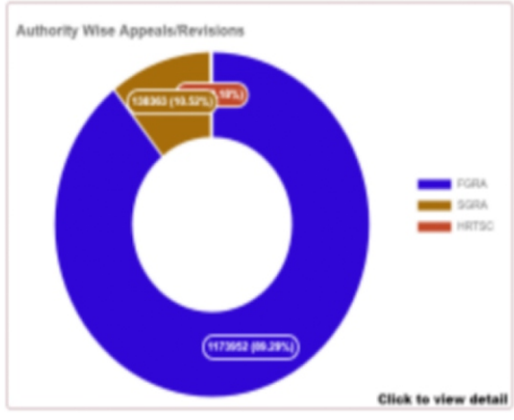
b. Authority wise appeals/ revisions [Fig. 3]

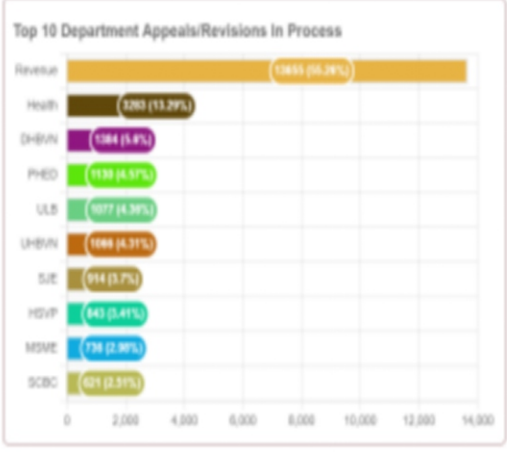
c. Top 10 department wise appeals/ revisions [Fig. 4]

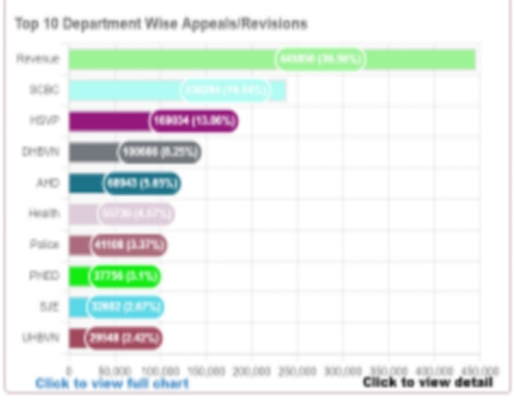
d. Top 10 service wise appeals/ revisions [Fig. 5]

e. Top 10 department wise appeals/ revisions in process [Fig. 6]

f. Top 10 service wise appeals/ revisions in process [Fig. 7]







EVALUATION & SUCCESS STORIES OF AAS

I. External Evaluation

While the Commission received widespread appreciation for its pro-active role in ensuring delivery of notified services and also received accolades from the beneficiaries the Commission wanted an independent assessment of its work to be done to keep an eye on the functioning of the Commission and response among public at large.

The Commission engaged an independent empanelled agency of Government of Haryana, namely, Institute of Development and Communication which submitted its report on 06.02.2024. While findings of this study are generally satisfying and the results are encouraging, there are some suggestions which are being implemented by the Commission in right earnest. Copy of this evaluation study has also been hosted on the website of the Commission keeping in mind the principles of transparency.

II. Feedback Form

After the satisfactory resolution of the revisions received, all appellants receive a feedback form to share their experiences with the Commission. This feedback is a vital part of our commitment to continuous improvement. Once the forms are collected, each response is meticulously analysed to gain insights into our performance. We examine both positive and constructive feedback to understand what aspects are working well and identify areas where we can make enhancements.

This feedback loop is crucial for maintaining high standards of service and ensuring that we address the evolving needs of the appellants effectively.

III.Happiness stories

These are heartfelt messages that appellants voluntarily send to the Commission to express their satisfaction with the resolution provided by the team. Such stories highlight the positive impact of our work and provide valuable insights into the effectiveness of our service.

One notable example is from Sh. Nishant Gupta, who shared his experience in detail which has been written

here verbatim “I sincerely thank you for your cooperation in this regard. I had been following up on my case for the last 7 months and I was seeing no hope in this matter but when I came to know about you from Sh. Sanjay Sharma sir and filed my complaint to you then I saw the light of hope. I was kind of broken after following up again and again with the Huda office and was under an impression of why we decided to move back to India from Singapore. I cannot describe my seven months' struggle

in words and just a "THANK YOU" is not enough because I can't express my gratitude towards you for many sleepless nights, my restlessness, and my inner pain. I just want to convey to you that you guys are doing an amazing job and you are the most wonderful people I have ever met in Government offices. I salute and thank you from the core of my heart and wish that people like me will not suffer until you are there in the system."

These "Happiness Stories" not only validate the efforts but also inspire and motivate the team of to continue striving for excellence. They serve as a testament to the positive outcomes achieved and the meaningful difference made in the lives of public through technology.

Way Forward:

It is worth mentioning that AAS has received its copyright certificate from Registrar of Copyrights.

1. **Enhancing online accessibility of services:** Efforts are underway to transition all services to online platforms, primarily through the Antyodaya Saral Portal or departmental portals. The aim is to eliminate offline applications wherever feasible. For services that must still be received offline, steps are being taken to digitize receipts for integration into the Auto Appeal System, ensuring streamlined grievance redressal processes.
2. **On-boarding all other remaining services on AAS:** As of March 31, 2024, out of 656 services, 427 have been integrated into the Auto Appeal System. This system automates appeals for services not delivered within stipulated timelines. The Commission continues to address technical challenges, such as integrating external portals like Vahaan and Sarathi, to onboard all notified services onto the AAS. Multiple high-level meetings have been convened to expedite this process, underscoring its importance to both the Hon'ble Chief Minister and the Chief Secretary of Haryana.
3. **Raising public awareness and sensitization:** Despite extensive statewide visits and media coverage, including printing RTS due dates on applicant acknowledgements, significant efforts are still required to educate the public and public representatives about the Act's provisions, appellate mechanisms, and the Auto Appeal System. Ongoing initiatives include sensitization sessions chaired by the Hon'ble Chief Minister for all Ministers and MLAs, demonstrating the Commission's commitment to enhancing awareness.
4. **Strengthening systems and enhancing features:** The Commission has identified issues such as server space and backup facilities for departmental portals and is actively collaborating with the State Government to resolve these challenges. This initiative aims to fortify the infrastructure supporting service delivery mechanisms across departments.

5. **24/7 helpline availability:** Presently, the Antyodaya Saral helpline operates from 7:00 AM to 8:00 PM on Mondays to Saturdays, excluding government holidays. The Commission has recommended extending this service to a 24/7 basis to better accommodate public convenience and accessibility.
6. **Accountability framework for FGRAs and SGRAs:** The Commission is advocating for amendments to the Haryana Right to Service Act to empower the Commission to impose penalties on Appellate Authorities (FGRAs and SGRAs) for service delivery failures. Presently, the Commission can only recommend disciplinary actions to the State Government, which may not always result in corrective measures.
7. **Addressing systemic issues and portal integration:** Instances of private entities managing departmental portals and experiencing disruptions due to non-payment have been noted, causing inconvenience to the public. The Commission aims to review and enhance the functionality and integration of all portals to ensure robust and efficient service delivery unmatched by any other state in India.
8. **Replicating AAS across states on request:** The Commission has obtained copyright for the Auto Appeal System and is open to its adoption by other states. Collaborative efforts with Jammu & Kashmir, Uttarakhand, Assam, and Maharashtra demonstrate willingness to share expertise and facilitate systemic improvements in service delivery nationwide. The Commission believes widespread adoption of such systems can significantly enhance the ease of living for citizens across India, provided laws are implemented effectively and consistently.

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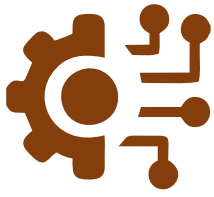
CHAPTER 8

Towards Udyam As A Digital Public Infrastructure: Accelerating Disruption Through Technology to Unlock Msme Opportunity For Viksit Bharat @ 2047



Authors:

1. **Ms. Simmi Chaudhary,** Economic Adviser & Joint Secretary, Ministry of Micro, Small & Medium Enterprises (MSME), Government of India

Abstract:

The Micro, Small, and Medium Enterprises (MSME) sector is integral to India's economic landscape, contributing significantly to employment, innovation, and exports. Despite its potential, the sector grapples with challenges such as access to credit, lack of financial literacy, and limited market reach.

The Ministry of Micro, Small, and Medium Enterprises (M/o MSME) launched the Udyam Registration Portal (URP) and Udyam Assist Platform (UAP) to simplify the registration process for all types of enterprises, with minimal documentation required. While the Udyam Registration Portal aims to facilitate the registration of all enterprises, the Udyam Assist Platform specifically targets onboarding Informal Micro Enterprises (IME) with the assistance of Designated Agencies. These initiatives have been successful in creating a strong foundation for a Digital Public Infrastructure for MSMEs.

Furthermore, the paper proposes a roadmap to evolve Udyam into a Digital Public Infrastructure that leverages emerging technologies. By adopting an open architecture, unification of the Government initiatives, Udyam can create a digital platform for multiple stakeholders in the MSME ecosystem. It can boost economic growth, and position MSME as key players in domestic and international markets. Embracing these initiatives, the Udyam Platform can aim to pave the way for a digitally inclusive India and foster the sustainable and inclusive development of the MSME sector.

Introduction:

The Micro, Small, and Medium Enterprises (MSME) sector plays a pivotal role in the Indian economy. MSME collectively employ more than 20 crore individuals,1 underscoring their critical role in job creation and economic development. As per recent estimations, MSME contribute over 29% to the nation's Gross Value Added (GVA) and more than 45% in overall exports2. The MSME sector not only fuels economic growth but also fosters innovation, entrepreneurship, and equitable development across the nation.

However, the MSME sector faces several challenges that hinder the unlocking of its full potential. **Access to credit** remains a bottleneck, with many Micro enterprises not yet formalised. They still don't have access to better financing options from financial institutions. Most MSME must go through complicated loan application and sanction processes and delayed disbursals, along with higher interest rates. There is also limited access to collateral-free loan for MSME. Overall, challenges in access to affordable, adequate, and easy credit make it difficult for MSME to operate profitably. There is also a gap of financial literacy for the MSME, which leads to poor cash flow planning and business continuity management. There is also a notable supply-demand gap in **Skill availability,** affecting the quality and efficiency of the workforce. **Access to Market,** both domestic and global, is another hurdle, limiting the growth and competitiveness of these enterprises. Additionally, the adoption of advanced **Technology** is often slow due to a lack of awareness of the latest technology in the market and limited funds for investment in technology upgradation. **Awareness** about various Government schemes and initiatives is another area for improvement to enable more MSME take full benefit of the existing Government support and schemes. There is also a high cost of compliance for MSME, which increases their operations cost and affects their profitability.

Moreover, there is a lack of comprehensive data of MSME, which impedes effective **Governance** and policymaking. This is primarily due to unwillingness of informal enterprises to get formalized. Addressing these challenges is crucial for enabling the full potential of the MSME sector and ensuring its sustained contribution to the Indian economy. The Government of India launched the Udyam Registration Portal, aimed at creating a digital platform for data collection and MSME identification, which is an imperative for effective governance. Udyam Registration Portal has seen a high adoption rate in its short span of time and has created a foundation for a Digital Public Infrastructure for MSME.

As on 22nd July 2024, the total **registrations** have reached an impressive **4,75,59,785,** demonstrating the sector's extensive reach and influence. **Micro Enterprises** dominate the landscape with **4,67,21,950** registrations, followed by **small enterprises at 7,11,408,** and **medium enterprises at 67,6613.** The Government of India has embarked on a journey to empower and support MSME through transformative MSME e-Governance initiatives and Udyam can play a critical role in creating a foundation for effective governance, **with "Maximum Governance, Minimum Government".**

The Udyam Registration Portal is evolving as a Platform to chart out the journey of Digital Public Infrastructure (DPI) for MSME, streamlining the registration process and facilitating their integration into the formal economy. Launched by the Ministry of Micro, Small and Medium Enterprises in 2020, this portal replaced the earlier Udyog Aadhaar system, offering a seamless, paperless, and free online registration process based on self-declaration. It empowers MSME by providing lifetime validity for the registration certificate, thus enabling easy access to credit, Government schemes, subsidies, and

protection against delayed payments. By significantly reducing administrative burdens and enhancing operational efficiency through digital integration with other Government systems like GST and Income Tax, the Udyam Registration Portal not only simplifies compliance but also opens new market opportunities for MSME. Its comprehensive, user-friendly approach ensures that even the smallest enterprises can leverage Government support and drive economic growth, making it a key DPI for the sustainable development of India's MSME sector.

Udyam registration portal has seen high adoption since its inception:

The Udyam Registration Portal stands as a testament to the Government of India's commitment to support and accelerate the growth of entrepreneurship by revolutionizing the registration process for MSME by replacing the earlier Udyog Aadhaar system. Since its inception, the portal has simplified the registration process, offering a user-friendly interface and seamless online solution. **As of July 22, 2024, 4.75 crore MSME (2.77 crore through Udyam Registration Portal and 1.99 crore through Udyam Assist Platform)**[4] have successfully registered, marking a significant milestone in enhancing the sector's accessibility to Government support and data-driven policy making.

Over the last 4 years i.e., from 2020-21 to 2023-24, Udyam Registration Portal has seen an exponential rise in number of registrations. The number of registrations has increased from **28.47 lakh**[5] **in 2020-21 to 4.75 crore in 2023-24**[6]. This growth is significantly driven by Micro Enterprises, thereby demonstrating that the Udyam Registration Portal has simplified the overall process of bringing more entities in the formal set up. Today, Udyam Registration number is mandatory for entities to gain benefits in the award of Government contracts and become eligible for Priority Sector Lending with various financial institutions. Since its launch on 1st July 2020, the total investment and turnover of the registered Micro, Small and Medium Enterprises (MSME) have shown an increasing trend, as detailed below[7]:

Year Wise total Investment & total Turnover under Udyam Registered MSME Since 1st July 2020 to 14th July 2023

Year	Total Investment (in Rs.	Total Turnover (in Rs. crore)
2020-21	404,683.08	4,787,788.47
2021-22	684,670.12	9,214,009.94
2022-23	785,762.89	11,239,434.45
2023-24 (as on 14th July 2023)	758,938.30	14,503,951.65

Looking forward, the Udyam Registration Portal is poised to evolve further, leveraging digital technologies and innovative features to better serve the diverse needs of MSME across the country.

Udyam registration: multiple benefits for MSME

The Udyam registration process is based on self-declaration and sharing of KYC information, enabling MSME to register themselves for free and obtain the Udyam Registration number. The registration process is entirely digital and takes only minutes to complete. Once completed, the MSME gets an Udyam registration certificate, which serves as proof of registration.

Figure 1: Multiple benefits of Udyam Registration

The Udyam Registration Certificate confirms the registration of the MSME and contains a unique identification number that helps them avail several benefits provided by the Government, including access to credit, access to market, technology, and infrastructure. It also provides safeguards against delayed payments, simplifies administrative processes, and enhances business operations.

- **Access to Credit:** Micro and Small Enterprises (MSE) with Udyam Registration Certificate is eligible for collateral-free loans from banks and financial institutions, making it easier for them to access the necessary funds to grow.
- **Access to Market:** Udyam Registration enables MSME to register on the Government e-Marketplace (GeM), enhancing their market visibility and facilitating participation in Government tenders. With an Udyam Registration Certificate, MSME have a significant advantage over unregistered businesses when it comes to Government procurement processes. They are eligible for a waiver of Government security deposits (EMD), while participating in tenders. There are also direct tax law exemptions that reduce tax liabilities.
- **Sustainability:** MSME registered in the Udyam Portal are protected against Delayed Payments. Udyam registered enterprises can file a complaint against any delayed payments by their buyers, ensuring timely payments for their products or services through SAMADHAAN Portal. This helps MSME to manage their working capital and run a sustainable business.

Udyam Assist Platform: Supporting Informal Micro Enterprises (IME) for Growth:

The Udyam Assist Platform (UAP) is an innovative digital tool designed to facilitate the formalisation of informal Micro enterprises across India. Formalisation is crucial for MSME to access formal credit, Government support and schemes, and market opportunities. The UAP simplifies the registration process, making it more accessible and efficient for the Informal Micro Enterprises (IME) to become part of the formal economy.

The platform aligns with the vision of Digital India, leveraging technology to streamline processes, and provide a seamless user experience. By registering on the Udyam Assist Platform, IME can obtain their unique Udyam Assist Certificate Number (UAC), which is a prerequisite for availing benefits of Priority Sector Lending with various financial institutions.

Udyam Assist Platform is currently being operated by Small Industries Development Bank of India (SIDBI) and is operational since January 2023.10 This platform allows Designated Agencies, such as, Banks, Non- Banking Financial Corporations (NBFCs) and Micro Finance Institutions (MFI) to register Informal Micro Enterprises on the platform with their consent. This allows the IME to become eligible for Priority Sector Lending and get preferred loan terms from the Financial Institutions.

Figure 2: Multiple benefits of Udyam Assist Platform

Way Ahead for Udyam as a Digital Public Infrastructure:

To ensure that the Udyam Portal continues the evolution process and becomes the key Digital Public Infrastructure, it is important for Udyam to emerge as a multi stakeholder platform under the framework proposed by United Nations Development Programme (UNDP). A platform approach addressing multiple stakeholders with seamless data sharing, following networked open technology standards and enable effective governance of the ecosystems.

Emerging technologies, such as, Artificial Intelligence (AI) coupled with massive data, co-creation, and policy push from the Government, give birth to innovative business models. The convergence of Machines, Platform, and Crowd have been a powerful force behind the changing market dynamics. Disruption from steam to electric power and subsequent technologies forced businesses to complete on innovation, agility, and price. Those who adopted quickly, accelerated change and remained leader, rest became history.

It would be prudent here to refer to "Machine, Platform, Crowd: Harnessing Our Digital Future", by Andrew McAfee and Erik Brynjolfsson, wherein authors have highlighted that the paradigm shift

from the traditional approach in the modern economy is to create value (mind), monetise the idea (product), and make a business (core). However, with the exponential technologies, machines coupled with big data have become smarter (machine), Platforms that allow businesses to facilitate resource sharing and transactions without owning them (platform), and crowd that works together to co-create, connected through internet (crowd). The convergence of machine, platform and crowd has begun to disrupt the order and supersede mind, product, and core. The best part is that it serves a greater opportunity for everyone, and the key is to sustain this disruption and not to get disrupted in the process. India being an early mover, has always been in an advantageous position and has created Digital Public Infrastructure in core, such as Aadhaar, DigiLocker, GSTN, API Setu, etc. and in various sectors, such as, Ayushman Bharat Digital Mission (ABDM) in Health, National Digital Education Architecture (NDEAR), and Digital Infrastructure for Knowledge Sharing (DIKSHA) in education, Urban Platform for Delivery of Online Governance (UPYOG) in an Urban governance, etc. It has not just improved the Governance and service delivery but has also made a significant impact on improving the ease of doing business for various stakeholders in the respective ecosystems. The platform approach has allowed all the stakeholders, including Governments at all levels, and businesses to come together, co-create solutions and serve citizens effectively. These have energised entire cosystems by converging and synergising efforts that were so far operational in silos.

Taking the philosophy forward, to ensure the Udyam Portal continues the evolution process and becomes the key Digital Public Infrastructure for MSME sector, it is important for Udyam to emerge as a platform that is ever evolving, sustainable and dynamic, that is built on open systems, has a modular architecture, allows legacy systems to connect and support emerging technologies as AI / Machine Learning (ML), Data Analytics, big data, multichannel interfaces, cloud etc to deliver value added services to and by MSME. These innovations can be aimed at streamlining processes, improve communication, fostering a supportive ecosystem and support MSME to compete effectively in the industry. The following section explores some innovative ideas that can lead the way for Udyam. These innovations can be aimed at streamlining processes, improving communications, and fostering a supportive ecosystem and supporting MSME to compete effectively in the industry.

There is presently a need to explore potential future enhancements for the Udyam Registration Portal, proposing innovative features, such as, deeper integration with, inter alia, Goods and Services Tax Network (GSTN), Ministry of Corporate Affairs (MCA), Government e-Marketplace (GeM), Trade Receivables Discounting System (TReDS) and other National Public Digital Infrastructure to drive further Innovation in MSME sector.

By embracing these forthcoming innovations, the Udyam Registration Portal seeks to reinforce its role as a catalyst for MSME empowerment, paving the way for a digitally inclusive India, where small businesses flourish as engines of economic resilience and prosperity.

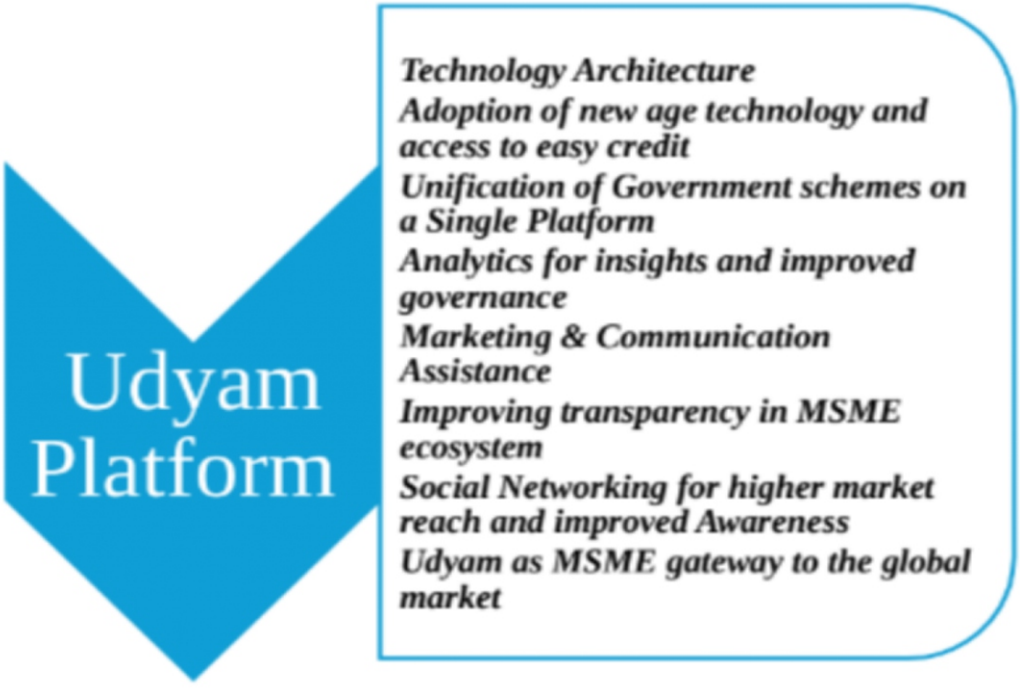


Figure 3: Benefits of Udyam Platform

a. Technology Architecture

To serve MSME and ensure their empowerment through enablement and make them effectively contribute to India's economy, there is a need to rise above the designing of individual projects that operate in silos and adopt the machine, platform, and crowd strategy. The effort will begin from the Udyam Portal, which needs to evolve as a Public Digital Platform. Considering the potential contribution and impact it can make on macroeconomic factors of India's economy, it is a fit case for designing and adopting an Enterprise Architecture Framework, tailor-made for the Indian conditions, to serve the aspirations of large and diverse country. This will be a Digital Public Infrastructure for delivering high-quality Government services in complex and heterogeneous environment for multiple stakeholders in the MSME ecosystem.

Typically, enterprise architecture was seen as command- and-control model as it requires significant architectural effort, time and specialised skillsets. Contrary to the perception, enterprise architecture instead does not mandate or even suggest a centralization, it suggests a federated architecture, wherein participants can design and develop new solutions based on the common principles and standards, to introduce interoperability. It is not a monolithic architecture, rather it is technology- agnostic, enables evolution of various solutions, again on common principles and standards. The centralisation is of principles and standards, and not of technological solutions. It is a unification of solutions through a common thread of principles and standards, and not the integration of solutions or centralisation by means of proprietary systems.

Udyam can be enhanced to support enterprise architecture built on common principles and standards, broken down in its core building blocks, facilitate interoperability, reusability, and inclusiveness. A modular approach will not just facilitate reusability but will also enable addition of new solutions seamlessly and create a new stack of digital services, such as, Enterprise Architecture, fuelled with Government data, run on AI engine, and thus has the potential to galvanize the ecosystem, transcend technological, geographical, and political boundaries, and ensure a whole of Government experience to citizens and businesses, especially MSME.

An improvised Udyam Platform with open architecture will enable fintech and ecommerce platform operators to create new innovative solutions for MSME, which will enhance ease of doing business and make it easier for MSME to adopt new technology.

b. Adoption of new age technology and access to easy credit

The Udyam Platform can significantly improve credit availability for MSME through the adoption of new technology. By integrating advanced technologies like AI and ML, the platform can provide real-time credit scoring and risk assessment, enabling quicker and more accurate lending decisions. Blockchain technology can enhance transparency and security in financial transactions, building greater trust with lenders. Additionally, the use of big data analytics can offer deeper insights into market trends and MSME performance, helping financial institutions to tailor their credit offerings. Digital onboarding and automated loan processing can further streamline the credit application process, reducing the time and effort required for MSME to secure funding. These technological advancements can collectively enhance the efficiency and effectiveness of credit facilities, ensuring MSME have better access to the financial resources they need.

c. Unification of Government schemes on a Single Platform

Unification of all Government schemes on Udyam Platform through API integration will enhance accessibility and usability and create a single window application for all benefits and services.

This will also facilitate data sharing between multiple digital systems/ schemes/ Ministries/ Departments. MSME can navigate different Government initiatives and avail benefits through a unified interface. This centralization will simplify the processes and improve scheme effectiveness. The Ministry of Agriculture's e- NAM platform is a successful example, integrating agricultural markets for better price discovery and transparency. Another example is the Pradhan Mantri Jan Dhan Yojana (PMJDY), which integrated multiple Ministries to provide universal banking access, linking bank accounts with Aadhaar and mobile numbers for direct benefit transfers. Inspired by these examples, Udyam can integrate MSME schemes, ensuring real- time data synchronisation and responsiveness to MSME needs.

To ensure comprehensive coverage through an ever evolving and dynamic digital infrastructure, unification of all schemes centred on MSME, that cuts across State Governments, Central Ministries, is essential to allow MSME to leverage cross sectoral platforms for all approvals, compliances, and availing benefits of Government schemes. Federated structure of the platform, facilitating connect with APIs will ensure consolidation and universalisation to expand benefits to MSME. Comprehensive APIs facilitate data exchange with other Governmental and financial systems, enhancing interoperability and streamlining services, such as, credit assessments and subsidy disbursals, fostering efficiency, transparency, and trust.

Udyam Platform's integration with the existing core platforms, such as, MyScheme, API Setu, DigiLocker, etc. will further boost the efficiency of services delivery. Consolidation of existing schemes and projects, its linkages with e-Shram, National Career Service (NCS) and Skill India Digital (SID) is being done to improve delivery of G2C, B2C, and B2B services relating to credit facilitation, skilling, and markets. This will not just result in optimising Information and Communication Technologies (ICT) investment of the Government but will also enable MSME to effectively participate in nation building.

d. Analytics for insights and improved governance

By leveraging extensive data from registered MSME, the Udyam Platform will utilise advanced analytics to extract valuable insights. This data-driven approach will enable policymakers to identify trends, challenges, and opportunities within the MSME sector with greater precision. With comprehensive data analytics, policymakers can craft better targeted interventions and measure the effectiveness of the policies that address the specific needs and pain points of MSME. The insights gained from analytics will inform strategic decisions, optimize resource allocation, and drive innovation. Additionally, a real-time data analysis can enable a real- time measurement and fine-tuning, thus ensuring that the Government interventions can deliver benefits effectively and timely to the MSME ecosystem.

e. Marketing & Communication Assistance

Today, MSME face challenges in adequate and easy Access to Market due to limited awareness and access to digital systems. Large corporations can invest in their own digital platform for marketing and communication and hire resources for maintenance and development, where MSME face a challenge on account of scale and ensuring higher costs. The Udyam Platform can provide free services for Digital Marketing for MSME. This platform can offer features, such as, free Udyam webpage domains, allowing MSME to create a professional online presence using free domain names ending with "MSME". Easy-to-use, wizard-based generators and pre-designed website templates can enable MSME to quickly set up their websites and promote their products and services. The platform can also facilitate product catalogue, listing the Products and services of the

MSME for marketing purpose. MSME can connect with potential customers and expand their market reach utilising these services. MSME can also create job postings giving better reach for youngsters and professionals looking for job opportunities. Additionally, to enhance formal communication, the platform can provide MSME with free domain email addresses, adding more authentication and professionalism to their communications within the business ecosystem. With these enhancements, the Udyam Platform can facilitate greater Access to Market for MSME, serving as a platform for B2B networking and collaboration. By connecting MSME with potential business partners, suppliers, and distributors, the platform can help them expand their reach and forge new partnerships that can drive business growth.

f. Improving transparency in MSME ecosystem

The Udyam Platform can improve transparency by creating a trust score of the MSME with current financial standing using a balances scorecard through integration of various data from authentic sources. A trust score can be provided by integrating with legal platforms, National Company Law Tribunal (NCTL), and court case registries. Ownership and financial information can be integrated with MCA for ownership profiles, beneficial owner details, director's information, and financial information. Additionally, GST and EPFO integration can highlight instances of GST default via GST service providers and provide Employees' Provident Fund Organisation (EPFO) integration for employee benefits like insurance and pension services. Authorisation and KYC is another issue with MSME which can be resolved through KYC services that can be made available through Udyam Platform. Authorised promoters and directors registered on MCA platform can be integrated via Udyam Platform to enable KYC and digital signature services, which can encourage MSME to acquire business and transact digitally. These services will increase transparency and reliability for the MSME and large corporates to do more business with the MSME with more confidence. This will also help banks to get early indicators on the MSME status and will encourage banks to increase their MSME loan book with lower risk.

The Platform can facilitate B2B business by allowing businesses to inquire about MSME details and financial status. This key information can be pulled from other Government platforms, such as, GST, MCA, and EPFO after formal consent from the MSME. This will provide verified information about MSME, promoting transparency and accountability amongst buyers, MSME sellers, financial institutions, and job seekers. Furthermore, ownership profiles can be enhanced through MCA integration, and financial information can be enriched with comprehensive data to provide a detailed view of an MSME financial health. Regulatory compliance will be streamlined through integration with GST, EPFO, and other regulatory bodies, reducing administrative burdens.

This approach will allow MSME to do business with higher transparency and manage supply chain risk more effectively. This will also encourage large corporate to do more business with MSME ecosystem.

g. Social Networking for higher market reach and improved Awareness

Building an industry community within the platform can help MSME to network and collaborate, create connections, and share ideas, thoughts, and experiences. MSME can participate in forums and discussion groups to share best practices and learn from peers. The platform can also help identify and establish strategic partnerships for collaborative growth. This will help MSME get access to new markets with new buyers and suppliers and give an opportunity to diversify their existing business channels and improve sustainability. Additionally, the platform can be augmented to develop an integrated platform of knowledge sharing, where MSME can post their specific challenges which can be resolved by registered SMEs/Research Institutes/CoEs.

The new Udyam Platform can also enhance Awareness for MSME by serving as a centralised hub for information on Government schemes, financial assistance, training, and market access. It can feature easy navigation, news updates, success stories, webinars, and tutorials. Personalised notifications will keep MSME informed about policies, regulatory changes, and benefits, enabling them to make informed business decisions.

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h. Udyam as MSME gateway to the global market

The Udyam Platform can serve as a gateway for global buyers to explore Indian MSME, attracting global investors and boosting exports- integration with global value chains.

By offering a comprehensive and searchable database, the platform can provide detailed information about MSME's products, services, and capabilities, making it easier for international buyers to discover potential business partners. To attract global investors, the platform can showcase success stories, growth potential, and investment opportunities, supported by data-driven insights and analytics. Additionally, the platform can promote certifications and quality standards, ensuring that the MSME meet international expectations. By providing resources on export procedures, market access, and trade regulations, as well as training on international trade, the platform can empower MSME to expand globally. Overall, the new Udyam Platform can enhance the visibility of Indian MSME and drive their growth in global markets, also allowing ample product and market diversification and expansion, thus, providing scale up opportunity for the MSME.

Conclusion:

The future of MSME e-Governance through the Udyam Registration Portal represents a strategic initiative towards a knowledge economy and a digitally empowered India. By proactively equipping MSME with technological advancements, strategic support, and enhanced community engagement, these initiatives aim to foster inclusive growth and prosperity and significantly improve the ease of doing business for the MSME, increase penetration of Government initiatives and promote formalisation of the MSME ecosystem. Embracing these forthcoming innovations, MSME can

capitalise on emerging opportunities and drive economic resilience in the digital era. The Udyam Platform, with respective enhancements, can play a pivotal role in this transformation. Some key points which can be considered are:

- Udyam Registration Portal has been a successful initiative in formalisation of MSME and have seen high up take.
- Portal can now evolve in a platform and a DPI to act as a foundation for digital empowerment of MSME and improve governance through technology enhancements.
- Platform can focus on enhancing the quality and efficiency of service delivery for MSME. Below table provides the current challenges faces by MSME and the proposed solutions through Udyam Platform:

Figure 4: Solutions for existing challenges with proposed Udyam platform

In summary, the so perceived Udyam Platform with new age enhancements will empower MSME to grow in the digital era, promoting formalisation, innovation, and resilience, and thus, be stronger players for success both domestically and globally. Transforming Udyam into a Digital Public Infrastructure, carries an immense potential to harness emerging technologies to develop sustainable solutions to the problems of various stakeholders of the MSME ecosystem - solutions for India and solutions for the world. Leveraging technological advancements to consolidate the silos, and adopting dynamic data-driven decision making, can enable and accelerate disruption through new age technology to unlock exponentials to optimise the MSME opportunity towards a Viksit Bharat @2047.

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CHAPTER 9

Data Governance: Privacy and Security in the Digital Age for Viksit Bharat

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Abstract:

In the rapidly evolving digital landscape, efficient data governance stands as the cornerstone for ensuring data privacy, data protection and data security while fostering innovation. It serves as the protective framework for data, offering comprehensive methodology for acquisition, management, protection, storage, sharing and purging of data. This paper explains the dynamics of data governance with privacy and security going hand in hand, challenges and best practices across diverse sectors. This paper also emphasizes the imminent need for establishing robust data governance measures, particularly in India's evolving regulatory landscape. Drawing on existing practices, this paper identifies key essential components for comprehensive data governance framework and delves into crucial aspects such as data governance structures, principles, security protocols and major stakeholders such as Data Management Officer, Data Protection Officer, Information Security Officer. It also provides insights, learnt during the implementation journey, which may be found relevant for policymakers, businesses, and end-users, on the ways and means of navigating the complexities of data governance while balancing privacy and security with innovation imperatives.

Ultimately, this paper aims to stimulate strategic decisions and policy formulations that would strengthen India's data governance ecosystem, ensuring that it aligns with global best practices while addressing unique local dynamics.

Keywords: Data Governance, Privacy and Security in Banking, Data Governance in digital age, Technology trends in Banking.

Introduction:

In recent years, the rapid digitization of India's economy has led to an exponential growth in data generation and data consumption across various realms of activities. This digital transformation has also brought forth significant challenges related to data governance, privacy, and security. While it is unequivocally acknowledged that privacy is the fundamental right of an individual, the emerging technologies, widespread use of digital devices and exposure to social media pose challenge not only for the individuals but also for any organisation, being the custodian of such information. In this backdrop, enactment of the DPDP Act, 2023 is a much-needed framework, which seeks to provide shield for individual's privacy and nudge the organisation to deploy required security measures. Effective data governance is essential not only to identify and protect personal information but also to ensure regulatory compliance and maintain consumer trust. This paper broadly explains the process involved in creating data governance structures, with focus on challenges faced during the journey and the ways to overcome them. Drawing on the best practices and the experience gained during implementation, the paper also comes out with an approach that can be replicated in organisations of varied sizes, institutionalisation of various practices and so on.

Data Governance: An Overview:

Definition and Importance of Data Governance:

Data governance encompasses the policies, processes and technologies, an organization implements to manage integrity, quality, availability, usability and security of its data assets. It ensures that data is effectively managed throughout its lifecycle, from acquisition to disposal, while adhering to regulatory requirements and organization's internal policies.

Objective of Data Governance:

The broad objective of Data Governance revolves around the ASPIRE Model, which encompasses all the essential elements i.e. Accessible, Structured, Protected, Integrated, Reliable and Efficient.

Importance in the Digital Age:

In today's digital age, effective data governance not only safeguards personal information but also supports transparent and ethical data practices. It fosters a culture of responsible data management and compliance, crucial for sustainable business growth.

Digital Transformation Impact:

The impact of rapid digitization and increasing mobile and internet penetration have reshaped the entire landscape. Different sectors such as banking, telecommunications and e-commerce have adopted data governance practices having varying levels of maturity and compliance, posing challenges that require adaptive governance frameworks. The emergence of data-driven

technologies like artificial intelligence (AI) and Machine Learning (ML) further enhances governance requirements, necessitating agile frameworks that balance innovation with regulatory compliance.

Paradigm Shift:

Traditionally, People, Process and Technology constituted the typical data governance model designed to enhance organizational performance and resilience. However, many changes that are brought by market forces, regulatory and statutory changes, there is a definite shift in approach where data has assumed the central place necessitating re-alignment of People, Process and Technology and sets the new narrative.

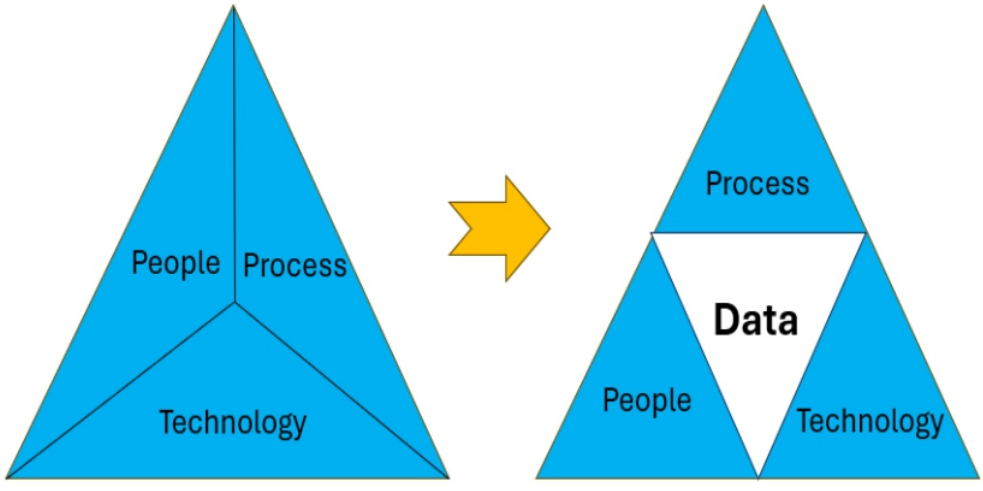

Fig1: People, Process and Technology[1]

Evolution of Data Governance:

Security, Privacy and Data Governance roles have evolved over the last few years with Data Governance gaining heightened importance. The below diagram presents an evolutionary journey of data governance, from passive to active roles.

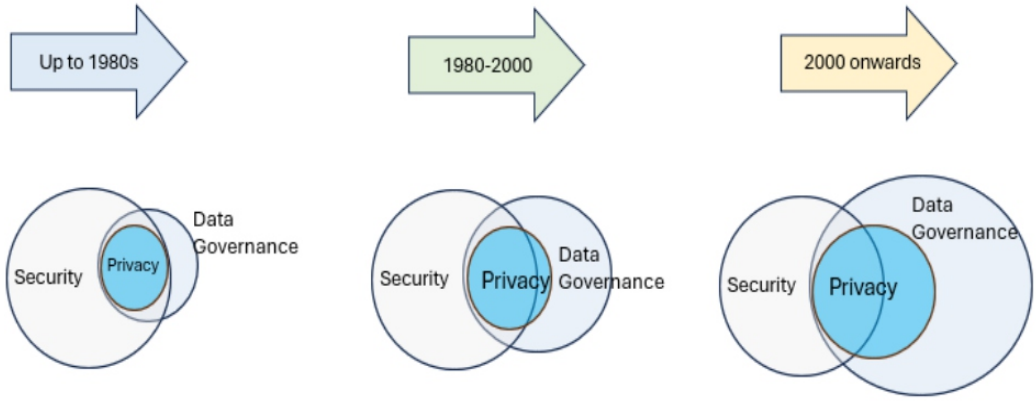

Fig2: Privacy and security vis-à-vis Data Governance

Key Components of Data Governance [2]

Data Governance Structure:

The structure broadly comprises a top driven, layered structure which democratises data governance across the organisation. Data Governance Councils are constituted at various levels with defined roles and responsibilities assigned to them. A typical structure comprises of three layers:

- Apex Level Data Governance Council: Provides overall leadership and sponsorship to all Data Governance initiatives and provides guidance and business context.
- Data Governance Councils at Business / Vertical level: Provides consistency and coordination for cross functional initiatives while maintaining an enterprise perspective and strategic approach.
- Data Governance Councils at Operating level: Operationalises Policies, Procedures, Standards and directions given by the apex body or the top management.

Policies and Procedures:

The journey starts with a Board approved policy and related procedure documents covering important areas such as data sharing & access within or outside the organisation, standard operating procedures on DLP (Data Leakage Prevention), data standards, data quality, data retention etc. These documents establish defined ownership and custodianship of data assets, provide guidelines ensuring uniformity in interpretation and role clarity across the organisation. While the Business, as data owners 3, are responsible for creating overall policies and rules around security and privacy, it is the IT, as data custodian, are required to implement appropriate tools and technology.

Data Management Principles: Data Governance by Design:

A clearly defined "Data Governance by Design" principle guides the organization in handling data consistently and responsibly. This principle is culmination of all three aspects i.e. Privacy, Security and Quality of Data. Characteristics such as transparency, purpose limitation, and data minimization ensure that data processing activities are lawful, fair, and aligned with user expectations. Governance needs to be established to review any products and processes from the lens of Data Governance right at the conceptualisation stage itself so that relevant aspects are intertwined at the start rather than an afterthought. Such templates provide checklists on all the relevant aspects giving clear Do's and Don'ts for product and process owners.

Data Security:

Data Governance plays the pivotal role in framing strategies and implementing security measures in the digital age to ensure protection of digital information and systems from unauthorized access,

misuse, and disruption. With the pervasive use of interconnected devices, the internet, and cloud computing, security measures are essential to safeguard sensitive data, personal information, intellectual property, and critical infrastructure. Security in today's times demands continual adaptation and vigilance to address evolving threats and advancements in technology.

Key components of security in the digital age include:

- **Cybersecurity:** This focuses on defending networks, systems, and data from threats such as malware, phishing, ransomware, and hacking. It involves deploying tools like firewalls, antivirus software, intrusion detection systems (IDS), and conducting regular security audits.
- **Data Privacy:** Ensuring that personal and sensitive information is collected, stored, processed, and shared in accordance with legal and regulatory requirements to prevent unauthorized access and breaches.
- **Network Security:** This encompasses measures to protect the integrity and confidentiality of data transmitted over networks, including both wired and wireless connections. It includes encryption, secure protocols, and access controls.
- **Endpoint Security:** Protecting individual devices (e.g., computers, smartphones, IoT devices) from cybersecurity threats through antivirus software, encryption methods, and remote management capabilities.
- **Cloud Security:** Ensuring the security of data and applications hosted in cloud environments through encryption, access controls, and regular security assessments to mitigate risks related to data breaches and service disruptions.
- **Physical Security:** Safeguarding physical infrastructure such as data centres, server rooms, and devices against unauthorized access, theft, and environmental hazards.
- **Compliance and Governance:** Adhering to industry standards and regulations (e.g., GDPR, HIPAA, PCI-DSS) to uphold sufficient security measures, protect data privacy, and mitigate legal risks.

Common Security Threats:

Security threats are the risks and vulnerabilities that pose potential harm to digital information, systems, and networks. These can exploit any weaknesses in technology, processes, or human behaviour, leading to unauthorized access, data breaches, financial loss, and disruption of operations. Some of the most prevalent common security threats include Malware, Phishing, Social Engineering, Hacking, Distributed Denial of Service (DDoS), insider threats, Ransomware, Man in the Middle Attacks etc.

Mitigants to Safeguard the Organization:

Organisation needs to establish robust policies covering all the critical areas such as Data Governance, Information Security, Cyber Security, Data Privacy etc. which would provide guidelines and protocols to deploy appropriate tools and technologies combined with robust governance mechanism for oversight and enforcement.

To ensure the security worthiness of these digital assets, Cyber Security Wing of the organization needs to perform various cyber security related activities, like Internal Ethical Hacking to perform ethical hacking as an outsider in production environment to find out any vulnerability in the systems or process.

Security Operations Centre (SOC) of an organisation needs to proactively monitor the cyberspace 24x7 and detect phishing and malicious domains that includes actions like analysing the content and code of phishing websites, taking these sites down, alerting/reporting to the stakeholders, etc. SOC may engage the services of Threat Intelligence Service Providers (TISPs) for proactively providing threat intelligence to assist the organisation in protecting its Brand, Websites and customers from external threats and fraudulent activities.

The security strategy should focus on proactive cyber risk management and maintaining strong cyber resilience and hygiene. Layered security approach, defence in depth and security by design.

Some of the important controls to enhance the overall security posture of Organizations' digital assets and infrastructure, are like multi-tier architecture to ensure isolation of risks at network level by segregating the presentation layer, application, and database layer, deployment of Next Gen Firewall, Web Application Firewall (WAF), Secure channel encryption (e.g. TLS 1.2) etc.

Data Privacy:

India is positioned as one of the largest data markets in the world, a comprehensive data protection and governance regulation certainly influence and greatly contribute to the evolution of the global data governance landscape.

Fragmented set of regulations and changing trends in Technology, made it necessary to have Dedicated Privacy Law for India. Although the foundation was laid down in 2017 in the form of Puttaswamy Judgement 4, which recognised 'Privacy' as intrinsic to the right to life and liberty, guaranteed by Article-21 of the Constitution of India, thus making 'Right to Privacy' a fundamental right.

The Digital Personal Data Protection Act, 2023 (DPDPA 2023), notified in August 2023 5 is a crucial legislative initiative aiming to safeguard personal data in Digital age. Organisation needs to designate a Data Protection Officer (DPO), with the overall responsibility to institutionalise Data Privacy to ensure accountability and compliance with data protection regulations. DPO to oversee data privacy

implementation, facilitates regulatory compliance assessments and serve as points of contact for data principles and supervisory authorities. Their expertise in data protection law and privacy principles strengthens organizational resilience against data breaches and fosters a proactive approach to data governance and regulatory compliance.

In the digital age, while lot of data-centric innovations are taking place, it is imperative to create robust organisational structures and re-align administrative processes around data to create balance between privacy and compliance assurance. In other words, personal data is crucial for providing services to consumers, employees, yet cautious usage of the same as per the applicable legislations, stringent strategy towards Data Governance, Data Security and Data Privacy helps organization to comply and ensure fundamental right of privacy of an individual.

trategies for Enhancing Data Governance:

Education and Training Programs:

Investing in comprehensive education and training programs enhances data governance literacy among employees, stakeholders, and consumers. Training initiatives on data governance principles, regulatory compliance requirements, and emerging technologies empower stakeholders to adopt best practices in data management, cybersecurity, and ethical data use. Continuous learning opportunities and knowledge-sharing forums foster a culture of data stewardship and accountability across organizations.

To promote Data culture, various strategies could be utilised such as message from the Head of the organisation / Top Executives on Data Governance, Data Governance Pledge, Quiz, Newsletters and Webinars etc., which are designed to ingrain the narrative in the overall organisational set-up.

Collaboration between Industry and Government:

Consultations and collaborations between industry stakeholders, government agencies, and regulatory bodies are instrumental in shaping effective data governance frameworks. Providing platforms for public-private partnerships to facilitate knowledge exchange, policy advocacy, and industry consultations will further improve the data governance standards, prompting regulatory reforms and technological advancements.

Technological Innovations in Data Governance:

Emerging technologies such as artificial intelligence (AI), and advanced analytics present transformative opportunities in enhancing data governance capabilities. AI-driven algorithms enable predictive analytics for proactive risk management and anomaly detection in data processing

activities. Self Service Business Intelligence facilitates democratic, secure, transparent, and immutable data visualisation, enhancing data integrity and trust in digital ecosystems. Leveraging technological innovations in data governance reinforces organizational resilience, operational efficiency, and regulatory compliance in a rapidly evolving digital landscape.

Metrics for Evaluation:

Quantitative data and analysis on data governance, by creating review/monitor metrics and success measures of the various organisational structures on an ongoing basis gives an indication and their impact on data culture and data quality showing the efficacy of the change management process highlighting areas of improvement, best practices in data governance and compliance. These metrics may include the Data Risk Assessment of the various stages of Data life Cycle (consisting of collection, processing, storage, sharing and destruction), data quality review reports etc. which shall facilitate the Council (Data Governance Body) in better management of the data.

Future of Data Governance in India:

The future of data governance in India is poised for transformational advancements driven by technological innovation, regulatory reforms, and evolving customer expectations. Various studies indicate a paradigm shift towards adaptive data governance framework that prioritizes agility, transparency, and accountability in data management practices. Regulatory reforms, including the enactment of comprehensive data protection legislation, are expected to harmonize data protection standards, enhance consumer trust, and stimulate investments in data-centric technologies. Innovations in AI, Robotic Process Automation (RPA), and cybersecurity solutions will redefine data governance paradigms, empowering organizations to leverage data as a strategic asset while safeguarding privacy rights and regulatory compliance. Traditionally, it is seen from governance point of view but now Data Governance is seen as driver for business growth.

Data Governance Journey in SBI:

The journey in SBI started in 2017 with the creation of enterprise-wide Data Governance Policy approved by the Central Board of Directors. Based on which the Data Management Office (DMO) was formed leading to the implementation a hierarchical Data Governance structure, starting from an Apex Level Council headed by the Managing Directors, Data Governance Councils (DGCs) at every Operating Units, down to branch-level Data Governance Officers (DGOs). This structure ensures clear ownership (Business as Data Owner, IT as Data Custodian) and defines roles such as Data Stewards at various operational levels.

Among the various activities carried out by DMO few activities to highlight are:

- Setting up frameworks and policies for regulatory compliance, including Data Governance policy and Procedures, Data Retention Policy, and SOPs for Data Sharing, Data Quality and Data Loss Prevention (DLP).
- Establishment of Metadata Repository in terms of Data Dictionary consisting of Business and Technical Metadata of IT applications containing element level data classification under four major heads i.e. Sensitive, Confidential, Internal and Public which helps in deploying appropriate security and privacy controls.
- Identification of Single Source of Truth (SSOT) for Critical Data Elements (CDE).
- Setting up secure Data Labs for collaborative and secure data sharing.
- Data Automation and evaluating Data quality during design of Products and Process.
- To inculcate data literacy, 1st June every year is celebrated as Data governance Day in SBI (also adopted by PSBs in India under the aegis of IBA), which is supported by Chairman's message on Data Governance Day, Data Governance Pledge, Quiz and Webinars etc., which are designed to ingrain the narrative in the overall organisational set-up.

The Data Governance journey in SBI exemplifies a proactive approach to managing data as a strategic asset. By integrating privacy, governance, security, compliance, and analytics, we aim to leverage data effectively for informed decision-making and sustainable business growth in a rapidly evolving digital landscape.

Conclusion:

To conclude, in the fast-changing digital landscape and evolving privacy regime, data governance is now the central theme to ensure data security and data privacy by providing enablers for managing data throughout its lifecycle. It guarantees the appropriate processes, executed by the right personnel, utilizing pertinent technologies Effective data governance is paramount in safeguarding data, customer privacy, enhancing cybersecurity, and ensuring regulatory compliance in India's evolving digital landscape. This paper has explored the dynamic interplay of regulatory frameworks, technological innovations and emerging trends shaping data governance practices. By examining best practices, lesson learnt, and future trends, this paper provides actionable insights for policymakers, industry leaders, and stakeholders to navigate complexities, adopt best practices and harness data-driven opportunities while safeguarding privacy rights and promoting responsible data stewardship. Embracing a holistic approach to data governance empowers organizations to build trust, drive innovation and achieve sustainable growth in the digital age.

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CHAPTER 10

Data Governance: Privacy and Security in the Digital Age

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Abstract:

In the modern, proficient data governance, privacy, and security are paramount. This discourse delves into these facets, underscoring the necessity for robust frameworks to manage data ethically and securely. Data privacy entails meticulous control over personal information dissemination, demanding stringent regulations to safeguard individual rights. Conversely, data security aims at shielding data from unauthorized access and breaches. The article accentuates the significance of these measures in fostering trust, ensuring regulatory compliance, preventing identity theft, and maintaining ethical standards. Through robust privacy and security practices, organizations can adeptly navigate the complexities of the digital age.

Key Words: Data Governance, Personal Information Protection, Trust Building, Regulatory Compliance, Security Measures

Introduction:

In the modern global landscape, where digital interactions define our daily routines, data plays a pivotal role in every sector from healthcare to business, education, finance, transportation, agriculture, entertainment, government services, and environmental sustainability. It enhances outcomes and efficiency through personalized and informed decision-making, risk management, and optimized operations. Given its ubiquity and critical importance, robust data governance, privacy, and security cannot be emphasized enough.

Data fuels innovation, drives economies, and empowers decision-making processes across sectors. However, this data-driven landscape also raises significant concerns about the protection of

personal information, cybersecurity threats, and regulatory compliance. Effective data governance frameworks are essential to ensure that data is managed ethically, securely, and in compliance with evolving legal standards.

This article delves into the critical aspects of data governance, focusing on privacy and security measures necessary to safeguard sensitive information, maintain trust, and navigate the complexities of the digital age responsibly and effectively.

What is meant by **Data Protection and Data Privacy?**

Data protection encompasses two crucial aspects: data privacy and data security.

Data Privacy:

Data privacy pertains to the meticulous control over the dissemination and disclosure of a consumer's personal data, including details such as their name, address, ethnicity, phone number, and marital status. With the burgeoning usage of the internet over recent years, there is an imperative need for the establishment of stringent data privacy regulations. These regulations ensure that personal information is handled with care, respecting individuals' rights and fostering trust in digital interactions.

Data Security:

Data security, on the other hand, involves the legal safeguarding of data against any loss, damage, or corruption. As data is now collected at an unprecedented rate, protecting this data from unauthorized access and potential breaches has become a critical issue. Effective data security measures are necessary to maintain the integrity, confidentiality, and availability of data, thereby ensuring that it remains reliable and secure throughout its lifecycle.

By understanding and implementing robust data privacy and data security practices, organizations can navigate the digital landscape responsibly, safeguarding personal information and maintaining compliance with evolving legal standards.

The Need for Data Privacy and Data Security:

In today's digital world, data privacy and data security have become critical concerns for individuals, businesses, and governments. The exponential growth in data collection, processing, and storage has brought immense benefits but also significant risks. Protecting personal and sensitive

information is paramount to maintaining trust, ensuring compliance with regulations, and safeguarding against cyber threats. This article explores the fundamental reasons behind the need for robust data privacy and data security measures.

Detailed Reasons Necessitating Data Privacy and Data Security:

1. **Protection of Personal Rights:** Personal data often includes sensitive information such as health records, financial details, and identity information. Ensuring data privacy protects individuals' fundamental rights and freedoms, preventing misuse or exploitation of their personal information.
2. **Building Trust: Trust** is a cornerstone of any relationship, whether between individuals and organizations or businesses and their customers. Demonstrating a commitment to data privacy helps build and maintain trust, fostering stronger and more loyal relationships.
3. **Compliance with Regulations:** Governments worldwide have enacted various data protection regulations, such as the General Data Protection Regulation (GDPR) in Europe. These laws impose strict requirements on how organizations handle personal data, making compliance essential to avoid legal consequences.
4. **Prevention of Identity Theft:** Identity theft is a significant concern in the digital age. Ensuring data privacy helps protect individuals from having their personal information stolen and used for fraudulent activities.
5. **Ethical Responsibility:** Organizations have an ethical responsibility to protect the privacy of their customers and employees. Respecting privacy rights reflects a commitment to ethical business practices.

Role of Justice Sri Krishna Committee in Data Protection Laws:

In 2017, the Indian government, through the Ministry of Electronics and Information Technology, appointed a committee chaired by Justice B.N. Srikrishna to draft a data privacy law for India. The committee's report, submitted on July 27, 2018, recommended distinguishing between sensitive personal data and critical personal data, suggesting stringent provisions for their collection and processing. It emphasized a fiduciary relationship between service providers and individuals, obligating fair and transparent data handling and adherence to the purpose limitation principle.

Key highlights from the report include:

- No retrospective application of the law, ensuring that it applies only to data collected after its enactment.
- Identification of lawful purposes for data processing, stressing the need for explicit consent from individuals, which could be withdrawn anytime.
- Stricter provisions for children's data protection.
- Scenarios allowing non-consensual data processing, such as for state welfare functions and legal compliance.
- Recommendations for appointing data protection officers, imposing hefty penalties for non-compliance, and establishing a data protection authority.

This holistic strategy is designed to establish a strong framework for data protection, emphasizing ethical handling, security measures, and adherence to evolving legal norms. By prioritizing transparency, accountability, and informed consent, organizations can responsibly manage data, respecting individuals' privacy rights and fostering trust. Implementing stringent security protocols, such as encryption and access controls, helps mitigate risks associated with data breaches and unauthorized access, ensuring the confidentiality and integrity of sensitive information. Compliance with dynamic legal standards like GDPR ensures that organizations operate within regulatory boundaries, minimizing legal liabilities and reinforcing their commitment to ethical data management practices in today's digital landscape

CODIFYING DATA PROTECTION IN INDIA:

Historical Background

In India, the evolution of data protection has been marked by significant legislative and regulatory developments aimed at safeguarding personal information in an increasingly digital age. Historically, data protection in India was addressed through scattered provisions in various laws without a unified framework specifically dedicated to privacy. However, this landscape changed notably with the introduction of the landmark judgment in Justice K.S. Puttaswamy (Retd.) vs Union of India by the Supreme Court in 2017. This ruling affirmed the fundamental right to privacy under the Indian Constitution, setting a pivotal precedent for subsequent legislative action.

Judicial Debates and Landmark Judgments

The concept of privacy has been a matter of debate in judicial courts, with some addressing privacy as a fundamental right and others not admitting it as a right under Article 21 of the Constitution. The celebrated case of Justice K.S. Puttaswamy v. Union of India (2018) finally pronounced the right to privacy a fundamental right safeguarded under Article 21.

Although, there were some provisions within existing laws like the Information Technology Act (2000) and the Indian Penal Code (1860) that dealt with privacy, there was an absence of a standalone, comprehensive law on the subject.

Legislative Developments

After seven years of making and three attempts to pass privacy legislation, India adopted a full-fledged data protection and privacy law on August 9, 2023. This law represents a significant step towards establishing a comprehensive legal framework for data protection in the country.

Relevance of Justice K.S. Puttaswamy (Retd.) and Another v. Union of India and Others

The Supreme Court's landmark decision in Justice K.S. Puttaswamy (Retd.) v. Union of India held that the right to privacy is protected as an intrinsic part of the right to life and personal liberty under Article 21 and as part of the freedoms governed by Part III of the Constitution. In addition, individual dignity was also cited as a basis for the right. Privacy itself was held to have a negative aspect, (the right to be let alone), and a positive aspect, (the right to self-development).

The sphere of privacy includes a right to protect one's identity. This right recognises the fact that that all information about a person is fundamentally her own, and she is free to communicate or retain it for herself. This fundamental tenet of informational privacy underscores the entitlement to autonomy and self-sovereignty concerning one's personal data. Unquestionably, this principle should form the cornerstone of any data protection framework.

Nevertheless, there are other interests to consider, as noted by the Court:

"Formulation of a regime for data protection is a complex exercise which needs to be undertaken by the State after a careful balancing of the requirements of privacy coupled with other values which the protection of data sub-serves together with the legitimate concerns of the State."

Thus, like other fundamental rights, privacy too can be restricted in well-defined circumstances. For such a restriction, three conditions need to be satisfied: first, there is a legitimate state interest in restricting the right; second, that the restriction is necessary and proportionate to achieve the interest; third that the restriction is by law. As gleaned from the excerpt from Puttaswamy, two pivotal points emerge: first, the primary objective of any data protection framework should prioritize privacy, while also recognizing broader societal values. After analysis, it can be observed that the normative framework of a fair digital economy serves as a valuable compass for balancing these considerations in specific contexts. The determination of whether a claimed right to privacy outweighs legitimate state interests in any given case hinges on judicial interpretation, with a focus on upholding the imperatives of a free and equitable digital society. This may involve fully protecting

the right to privacy, imposing justified restrictions, or applying a nuanced combination of both approaches. At its essence, this normative framework is grounded in the principles of freedom and fairness, which are fundamental to our constitutional principles and the core of our struggle for independence.

Finally, the Law- Digital Personal Data Protection Act, 2023

From Draft to Enactment

Starting with the introduction of the Draft Personal Data Protection Bill in 2018, which regulated the processing of personal data both within India and outside if it involved business activities, systematic offering of goods and services, or profiling individuals in India, the efforts to safeguard personal data have evolved significantly. The scope was further expanded under the 2019 bill to include anonymized personal data.

Building on these efforts, the Government released the Digital Personal Data Protection Bill, 2022, on November 18, 2022. This latest bill is part of a broader legislative framework that includes IT rules, the National Data Governance Framework Policy, and the upcoming Digital India Act, aiming to strengthen data protection and governance in the digital era.

Key Provisions of the DPDP Bill, 2022

The Draft Digital Personal Data Protection Bill (DPDP), 2022, represents a significant legislative effort by India to regulate the collection, processing, storage, and transfer of personal data. Key provisions include:

- Obtaining explicit consent from individuals
- Ensuring data minimization
- Enforcing strict data security measures
- Establishing penalties for data breaches and non-compliance

Despite the committee's detailed recommendations, the draft privacy bill underwent several revisions and consultations from 2018 to 2023, culminating in the enactment of the Digital Personal Data Protection Act, 2023. While the final Act introduces several amendments, it faces criticism for its limited protection for individuals, its focus on digital data only, and exemptions granted to the government and certain data fiduciaries. The Act also establishes penalties ranging from ₹10,000 to ₹200 crore, considering the nature and gravity of data breaches.

Synergy of Data Privacy and Security in the e-Courts Mission Mode Initiative:

The inception of the eCourts Project was rooted in 'The National Policy and Action Plan for Implementation of Information and Communication Technology in the Indian Judiciary' by the eCommittee, Supreme Court of India.

As a flagship initiative under the Department of Justice's National e-Governance projects, the eCourts Mission Mode Project has been instrumental since its establishment in 2007, catalysing significant advancements through Phase I and Phase II. Now advancing into Phase III with a substantial budget allocation of Rs. 7,210 crore, Phase I focused on foundational court computerization and network connectivity, while Phase II, initiated in 2015, aimed at empowering judicial services through ICT.

To balance the right of privacy, right to information, and data security, a Sub-Committee consisting of six judges of the High Courts, assisted by technical working group members consisting of domain experts, has been constituted by the Chairperson of the e-Committee to suggest/recommend secure connectivity and authentication mechanisms for data protection to preserve the right to privacy. The Sub-Committee is mandated to critically assess and examine the digital infrastructure, network, and service delivery solutions created under the eCourts project for giving solutions for strengthening data security and protecting the privacy of citizens.

At present following institutional arrangement for Data and Cyber Security is in place:

- In eCourts Phase II, public-facing applications developed centrally and hosted on central infrastructure is taken care of by the National Informatics Centre as per their comprehensive guidelines for secure application and infrastructure.
- These applications are audited periodically by NIC through CERTIN empanelled vendor.
- Comprehensive Cyber Security Audit of eCourts Applications and Infrastructure was completed under guidance of eCommittee.

Data Privacy in eCourts Mission Mode Project:

Protection of Personal Data:

The eCourts system handles vast amounts of personal and sensitive information, including litigants' names, addresses, financial details, and case histories. Ensuring this data is protected from unauthorized access is paramount. Implementing robust data privacy measures ensures that personal information is used solely for its intended judicial purposes and not misused or disclosed without consent.

Compliance with Data Protection Laws:

India's evolving data protection landscape, including the Digital Personal Data Protection Act, 2023, necessitates that the eCourts system complies with stringent data protection regulations. This compliance necessitates the formulation of unequivocal protocols for the collection, storage, processing, and dissemination of data, whilst ensuring the inviolable rights of data subjects are preserved and any breaches are promptly reported and ameliorated.

The Symbiotic Nexus between ICJS and Data Privacy:

The Inter-Operable Criminal Justice System (ICJS) aims to integrate various components of India's criminal justice system, including police, courts, prisons, forensics, and prosecution, to enable seamless data sharing and real-time access. While this initiative enhances efficiency, it raises significant data privacy concerns due to the sensitive nature of the information involved. Ensuring robust cybersecurity measures, strict access controls, and compliance with data protection laws like the Digital Personal Data Protection Act, 2023, is essential to protect against unauthorized access and misuse.

The Convergence of Digitized Case Records and Data Privacy:

The digitization of court records under the eCourts project aims to streamline judicial processes and enhance access to legal information. However, this shift to digital records brings significant data privacy concerns. Sensitive personal information, including case details, personal identifiers, and confidential legal communications, must be rigorously protected against unauthorized access and cyber threats.

Anonymization and Minimization:

To protect individual privacy, the eCourts project employs data anonymization techniques, stripping identifying information from datasets used for analysis and reporting. Data minimization principles also ensure that only the necessary data is collected and retained, reducing the risk of privacy breaches

Data Security in eCourts Mission Mode Project:

Secure Infrastructure

A secure IT infrastructure is fundamental to safeguarding the eCourts system. This involves deploying advanced cybersecurity measures, such as firewalls, intrusion detection systems, encryption, and regular security audits, to protect against cyber threats and vulnerabilities.

Access Controls and Authentication

Implementing stringent access controls ensures that only authorized personnel can access sensitive data. Multi-factor authentication (MFA), role-based access controls (RBAC), and regular access reviews are essential to prevent unauthorized access and ensure accountability.

Incident Response and Recovery

A resilient incident response strategy is essential for promptly addressing data breaches or security incidents. This strategy should delineate procedures for detecting, containing, and alleviating incidents, along with measures for data recovery and system restoration to reduce downtime and mitigate data loss.

Employee Training and Awareness

Human error remains a significant risk factor in data security. Regular training and awareness programs for judicial staff and other stakeholders on best practices for data handling, phishing awareness, and incident reporting are critical in fostering a security-conscious culture.

Navigating the Complexities of Data Privacy and Security: Challenges and Ramifications

Data privacy and security possess the transformative potential to significantly enhance the protection of generated data and its use for analytical purposes.

However, they are not immune to the constraints and regulations that often accompany their implementation. Data privacy and security face significant restrictions and shortcomings, including stringent regulatory requirements like GDPR, technological limitations in encryption and anonymization, and the need for data localization. Human error, insider threats, and third-party risks further complicate matters, while rapidly evolving cybersecurity threats and resource constraints challenge organizations, particularly smaller ones.

These shortcomings can have severe impacts, including financial losses from data breaches, fines, and lawsuits due to regulatory non-compliance. Organizations may suffer reputational damage, leading to a loss of customer trust and potentially decreased revenue and customer base. Stringent data privacy regulations can limit how businesses collect, store, and use data, potentially reducing the ability to personalize user experiences and target advertisements effectively.

Conclusion:

Steering Data Governance in the Digital Epoch: Attaining Harmonious Equilibrium

Traversing through the landscape of data governance in the digital age requires a delicate balance between leveraging the potential of data and safeguarding individual privacy and security. As technology evolves, so too do the complexities and challenges of protecting data. Establishing robust regulatory frameworks and ethical guidelines is essential to navigating this terrain responsibly and transparently.

From stringent data protection laws to advanced encryption protocols and proactive cybersecurity measures, governments, businesses, and individuals share a collective responsibility to uphold the integrity and confidentiality of personal data. Embracing a culture of accountability and continuous improvement in data governance practices not only enhances trust among stakeholders but also fosters sustainable innovation and digital progress.

Embracing Advanced Technologies

Advanced technologies such as artificial intelligence (AI) and blockchain hold significant promise in fortifying data protection measures. AI can detect threats in real-time, while blockchain ensures data integrity through decentralized ledgers. However, their implementation must be accompanied by rigorous oversight and ethical standards to mitigate potential risks and safeguard against misuse or breaches.

Balancing Privacy and Usability

It is undeniable that the overzealous pursuit of data privacy and security measures can potentially impede stakeholder usage and experience. Thus, striking a harmonious balance between data privacy, security, and data utilization is imperative for optimizing both user satisfaction and business objectives. Organizations must deploy robust data protection strategies without sacrificing usability, ensuring that security protocols are intuitive and do not obstruct access or functionality.

Cultivating Trust and Innovation

Transparent privacy policies and streamlined consent processes can cultivate trust while minimizing user inconvenience. By embracing a balanced approach, companies can safeguard sensitive information, adhere to regulations, and still harness data to provide personalized and engaging experiences. This equilibrium is vital for fostering innovation, enhancing user satisfaction, and driving sustainable growth within the digital ecosystem.

In conclusion, as technology continues to evolve, so must our approaches to data governance. By prioritizing both privacy and usability, and leveraging advanced technologies responsibly, we can create a digital environment that is secure, trustworthy, and conducive to innovation.

CHAPTER 11

Facilitating Standardization, Testing and Certification Activities in Telecom & ICT

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Abstract:

Standardization, testing, and certification are crucial for ensuring product quality, interoperability, safety, building consumer trust and fostering innovation. This paper briefs about the various initiatives by Telecommunication Engineering Centre (TEC) towards building an efficient and transparent ecosystem for Standardization, Testing and Certification of Telecom/ICT products, technologies and services so as to promote ease of doing business and fostering technological innovation in the Indian Telecom/ICT sector.

Keywords: Standards, Testing, Certification, Online portal, TEC

Introduction:

The Telecom/information and communications technology (ICT) industry has continuously experienced technological evolution. The standards and specifications ensure that products can connect and interoperate with each other, boosting innovation, and keeping ICT markets open and competitive. Standardization and standards boost progress and create a basis, upon which technology can evolve.

Standards also benefit the economy by incentivizing investments, as standards ensure the stability of the technology over a reasonable period of time, enabling economies of scale, encouraging greater and fairer competition, and facilitating trade thanks to common approaches among countries. In the majority of relevant technological contexts, the presence of a standard actively contributes to the consolidation of new technologies and to identifying evolution paths that are able to preserve past investments, which is a critical aspect, especially in a rapidly evolving sector such as ICT.

Further, the Testing and Certification of the Telecom/ICT products is also important to build trust and confidence among the users and to ensure quality and interoperability of the products.

Telecommunication Engineering Centre - National Standardization Body for Telecom/Ict Sector:

The Telecommunication Engineering Centre (TEC) is the technical arm of Department of Telecommunications, Ministry of Communications, Government of India, which is responsible for drawing up of standards, generic requirements, interface requirements, service requirements and specifications for telecom products, services and networks. Telecom Equipment Manufacturers/Suppliers get their products tested and certified against these Standards.

The objectives of TEC are:

i Development of new standards and update the existing ones in order to keep pace with the global development.

ii Establishment of state-of-art telecom laboratories.

iii Active participation in professional bodies such as ITU, IETF, APT etc. to protect country's interest.

iv Testing and Certification of Telecom/ICT products as per the TEC standard.

Tec Initiatives Towards Standardization Activities:

TEC develops the standards for the Telecom/ICT sector including emerging technologies like Artificial Intelligence, Quantum Technologies, Internet of Things, etc. TEC also contributes in the development of standards at various global standardization bodies like ITU, IEEE-SA, ETSI, ORAN Alliance, etc.

A. Development of Standards for Telecom/ICT Sector:

TEC prepares specification or standards with regard to Telecom network equipment, technologies, services and interoperability. The important advantages/needs of using TEC Standards, with regard to telecom equipment/network/services, are to:

- Ensure quality and reliability
- Comply with regulatory requirements & Improve market acceptance
- Ensure system interoperability & facilitate interchangeability of parts
- Comply with customer requirements & ensure safety of user
- Achieve economies in purchase of equipment

The specifications of TEC are of following types namely,

1. **Standard for Generic Requirements for a Product/Equipment:** The Standard for Generic Requirements for a Product/Equipment for a telecom network element or a set of network elements, lays down its requirements for the product/equipment to work seamlessly in Indian Telecom Network. These requirements refer to the following Interconnectivity and interoperability requirements, Quality requirements, EMI/EMC requirements, Safety requirements, Security requirements and any other equipment requirements that are considered generic.
2. **Standard for Interface Requirements for a Product/Equipment:** The Standard for Interface Requirements for a Product/Equipment refers to the requirements of an interface between two network elements at different layers of protocol stacks as applicable. Interfaces are defined at different layers for convenience of peer-to-peer communication.
3. **Standard for Service Requirements:** The Standard for Service Requirements details the services and network related requirements for specific applications, which should be met by service providers in accordance with the requirements specified by the Licensing Authority.
4. **Standard document of TEC:** The Standard Document of TEC refers to a set of standard/common requirements or specifications inter-alia, in respect of protocols, numbering, routing, switching, safety, security, EMI/EMC, environmental related requirements etc. issued by TEC for the equipment or product or network. It can be used either independently or can be referred to in Generic Requirements/Interface Requirements/Service Requirements of the telecom products/services
5. **TEC Test Guide:** Test Guide involves testing and measurements to be performed as per Standard for Generic Requirements of a Product/Equipment, Standard for Interface Requirements of a Product/Equipment and Standard for Service requirements.

TEC has laid a well-defined procedure for formulation and development of TEC Standards/Documents. TEC Standards/Specifications/Guidelines are formulated / adopted in consultation with its various stakeholders viz. Manufacturers, Traders, Telecom Service Providers, Labs, Academia, Telecom Association, other government organizations etc. The consultations take place in different steps through various Committees, Groups and forums constituted by TEC for this purpose. The wider participation of all the stakeholders are encouraged by conducting consultations/meetings in the hybrid mode.

A total of around 600 Technical Specifications are formulated that includes Generic requirements, Interface requirements, Service requirements, and Standards issued by TEC. As a part of the endeavor to be in line with the Atmanirbhar Bharat, TEC has made available all technical documents including all Standards and Test Guides, to public freely without any costs. These documents can now be downloaded freely from TEC website https://tec.gov.in/ . Any industry, academicians, students, start-up entrepreneurs can freely download and use these technical standards in their respective areas of works. Free flow of technical standards shall stimulate the industry in research, design, testing, manufacturing, etc.

B. Facilitating Indian Contribution to Global Standardization Bodies:

In present scenario, Contribution to the Global standards participation have become deeply strategic and important to catalyze technology development and manufacturing and position India as a leader in the international arena. The standardization activities for the Telecom / ICT products are being taken up at various international bodies viz. ITU, 3GPP, ISO, IEC, IEEE, OneM2M, etc. Participation in global standard setting organizations is essential to ensure consideration for local needs of the Indian communications industry and promote Indian industries/start-ups in the Global value chain.

Department of Telecommunications is the nodal department representing Government of India in ITU and TEC is the body coordinating the Indian activities corresponding to ITU-T study groups. TEC has constituted National Working Groups (NWGs) conterminous with ITU-T's Study Groups to contribute to ITU-T. The NWGs consists of stakeholders from industry, academia, government, research organizations etc. The NWGs build consensus and harmonize the interests of various stakeholders and proactively make necessary contributions to the global standardization bodies. NWGs along with the technical divisions of TEC also contribute to the other global standardization bodies like ORAN Alliance, IEEE SA, 3GPP, etc. The subject areas of various NWGs are given below.

S.No.	NWG	Subject Area
1	NWG-2	Operational aspects of Service provision and Telecommunication Management
2	NWG-3	Tariff and Accounting Principles and international telecommunication/ICT economic and policy issues
3	NWG-5	Environment and circular economy
4	NWG-9	Broadband Cable and TV
5	NWG-11	Protocols and test Specifications
6	NWG-12	Performance, QoS and QoE
7	NWG-13	Future Networks and emerging network technologies
8	NWG-15	Transport, Access and Home
9	NWG-16	Multimedia and related digital technologies
10	NWG-17	Security
11	NWG-20	IoT, smart cities & communities
12	NWG-QT	Quantum Technologies

Table I: Details of National Working Group

Standards Coordination Portal: TEC is actively contributing towards inclusion of Indian experiences in the global standards like ITU, IEEE-SA, etc. To facilitate this objective, TEC has developed a Standards Coordination Portal with the primary objective of increasing India's involvement in global standardization activities. This portal acts as a platform for sharing information and promoting collaboration in the telecom and related ICT domains. It brings together Indian experts from various sectors, including industry, academia, research institutes, government, and others.

The portal facilitates Indian contributions to different Global Standardization Organizations and Standards Development Organizations (SDOs). Currently, it is associated with National Working / Study Groups (NWGs/NSGs/SGs) corresponding to ITU-T/ITU-R/ITU-D Study Groups, and is being expanded to other Global Standardization Organizations such as IEEE, 3GPP, etc.

The portal is designed to be modular, responsive, user-friendly, and configurable to accommodate multiple Standardization Organizations. Registered members and contributors can access information from all National Groups through this portal. They can also upload and revise their contributions and view/download contributions from other members. In essence, the portal acts as a knowledge repository and a collaboration platform for standardization activities.

Simplification of Testing and Certification Process to Promote Ease of Doing Business

TEC carries out the Testing and Certification of the Telecom/ICT products to build trust and confidence among the users and also to ensure quality and interoperability of the products in the communication network. The certification process endeavors to encourage:

- **I** that any Telecommunication Equipment does not degrade performance of existing network to which it is connected;
- **ii** safety of the end–users;
- **iii** security of the Telecommunication Networks;
- **iv** protection of users and general public by ensuring that radio frequency emissions from equipment do not exceed prescribed standards;
- **v** that Telecommunication Equipment complies with the relevant National and International Regulatory Standards and requirements.

TEC provides two types of certification schemes against the Telecom/ICT products and services: Voluntary Certification and MTCTE.

A.Voluntary Certification:

TEC offers a number of voluntary certification schemes based on its technical standards. The different schemes under the Voluntary Certification Regime are:

i **Type Approval Certificate:** Type Approval is the process of testing and certification of telecom & related ICT product, in accordance with TEC Test Guide for conformance with the Standard for Generic Requirements for a Product/Equipment issued by TEC.

ii **Interface Approval Certificate:** Interface Approval is the process of testing and certification of telecom and related ICT product, in accordance with TEC Test Guide, for conformance with the Standard for Interface Requirements for a Product/Equipment issued by TEC.

iii **Certificate of Approval:** Certificate of Approval is the process of testing and certification of telecom & related ICT product (including integrated/innovative product & software in the emerging technology) as per Manufacturer's specifications. This certificate is granted only when TEC does not have a Standard/Specifications for Generic/ Interface Requirements of the Product. The testing shall be conducted in accordance with the Test Guide approved by TEC. This scheme encourages Foreign joint collaboration development etc. with an objective to provide technological developments in the country.

iv **Technology Approval:** Technology Approval is a process of testing and certification of prototype of a telecom and related ICT product developed by C-DoT, both public and private Academic Institutions/ Research Organizations / Startups in the field of Telecom sector. Technology Approval is given against the Standard for Generic Requirements issued by TEC for the product. The certificate encourages indigenization of technologies (Make in India)/ToT, production of competitive consumer products and motivates industries and R&D institutions for product innovation.

These certificates establish product credibility and trust since these are issued by TEC, a government entity. This also improves the overall business prospects of the firms manufacturing these telecom products.

TEC has launched the online modules for voluntary certification scheme. The modules aim at enhancing the Ease of Doing Business and promoting Atmanirbhar Bharat. It is a significant step towards streamlining the testing and certification process, enhancing the transparency and fostering an encouraging ecosystem for Start-ups and MSMEs in the Telecom and related ICT sector. The Start-ups and MSMEs can benefit by taking these certificates for their products pertaining to telecom sector for enhanced credibility of their product.

All types of certificates under the voluntary testing and certification can be applied for and processed seamlessly through the online portal https://www.mtcte.tec.gov.in/.

B. Mandatory Testing and Certification of Telecom Equipment:

Indian Telegraph (Amendment) Rules 2017, stipulate prior Mandatory Testing and Certification of Telecom Equipment (MTCTE) in respect of parameters as determined by the Telegraph Authority. TEC has been designated as the Telegraph Authority for the purpose of administration of MTCTE procedure, Surveillance Procedure and for formulation of Essential Requirements (ERs). Telecom Equipment would be tested and certified against respective Essential Requirements. Telecom Equipment would be tested and certified against respective Essential Requirements. There are two certification schemes, i.e. the General Certification Scheme (GCS) and the Simplified Certification Scheme (SCS). TEC has come out with various initiatives to reduce the compliance burden and promote ease of doing business:

I The MTCTE certification process is online through the MTCTE Portal https://mtcte.tec.gov.in/ .

ii Various products have been brought under the Simplified Certification scheme (SCS) so as to reduce the time taken for certification from eight weeks to two weeks and promote ease of doing business.,

iii Further, only administrative fee is being charged by the TEC for Essential Requirement (ER) based applications submitted under MTCTE irrespective of GCS and SCS category w.e.f. 01 January 2024. The evaluation fee has been completely waived off. This is a huge relief for the original equipment manufacturer (OEMs) or applicants as it amounts to reduction in application fee by more than 80 per cent, thereby further reducing the compliance burden.

C. Promoting Testing Infrastructure and Ecosystem:

TEC has been notified as the Designating Authority (DA) on behalf of DoT for designating Conformity Assessment Bodies (CABs) / Certification Bodies (CBs) located in India to perform testing and certification of telecom products. The role of TEC as DA is also to recognize foreign CABs/CBs as Mutual Recognition Arrangement (MRA) partner to perform testing and certification of telecom products as per India's requirements.

Online Portal for TEC Cab Designation: The application for CAB designation is in online mode through National Single Window System (NSWS) portal https://www.nsws.gov.in .

Testing Scheme for Start-ups & MSMEs: Recently, Department of Telecommunications (DoT) has launched a reimbursement scheme aimed at easing financial burdens for startups and Micro & Small Enterprises (MSEs) in the telecom sector. Designed to foster domestic manufacturing, attract investments, and enhance exports, the scheme will reimburse up to INR 50 lakhs per startup or MSE

for testing and certification costs essential for product quality and market access. The application process will be entirely online, simplifying procedures and ensuring efficient handling of submissions. Startups will receive 75% reimbursement, micro- enterprises 60%, and small enterprises 50%, reflecting DoT's commitment to equitable support for growth and innovation in the telecom industry.

Conclusion:

By providing online platforms, simplifying processes, and reducing compliance burdens, TEC is facilitating standardization, testing, and certification activities to achieve a more efficient, transparent ecosystem and promote ease of doing business. It not only accelerates product certification and builds trust among the users but also catalyzes technology innovation, positioning India as a global leader in telecom and ICT while ensuring wider Indian participation in global standards development.

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CHAPTER 12

Use of AI in Governance: The Case of Kisan e-Mitra in the PM KISAN Scheme

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1. Ministry of Agriculture and Farmers Welfare

Abstract:

The integration of artificial intelligence (AI) in governance is revolutionizing public service delivery. The 'Kisan eMitra' chatbot, launched under the Pradhan Mantri Kisan Samman Nidhi (PM KISAN) scheme by the Department of Agriculture and Farmers Welfare, is a significant example. This paper examines the AI-driven initiatives aimed at enhancing the scheme's efficiency and accessibility. The PM KISAN scheme, which provides financial assistance to farmers, faces challenges in information dissemination and grievance redressal. The Kisan eMitra chatbot addresses these by providing instant, accurate responses to beneficiary queries in multiple languages, leveraging AI and machine learning (ML) technologies. This AI solution ensures real-time assistance, reduces response delays, and caters to linguistic diversity, marking a transformative step towards inclusive and efficient governance.

Introduction:

The Pradhan Mantri Kisan Samman Nidhi (PMKISAN) is a central sector scheme launched in February 2019 to supplement the financial needs of land-holding farmers. Under this scheme, the financial benefit of Rs 6,000/- per year in three equal instalments every four months is transferred into the bank accounts of farmers' families across the country through Direct Benefit Transfer (DBT) mode. It is one of the largest DBT schemes in the world. The scheme leverages technological & process advancements so that all eligible farmers can be benefitted without any hassle. So far, the Government of India has disbursed over Rs. 3.24 Lakh Crores to more than 12 Cr. farmers. However, the scheme's success is impeded by challenges in information dissemination, eligibility understanding, and grievance redressal, primarily due to accessibility issues and technological barriers faced by many farmers.

Objective of Kisan e-Mitra chatbot:

The primary objective of the AI-based universal interface cum chatbot for the PM KISAN scheme is to offer prompt, clear, and accurate responses to the queries raised by the beneficiaries. This Chatbot system, uniquely designed to process and understand spoken questions, eliminates the need for typing, thereby enhancing accessibility for users who may have limited typing skills or prefer verbal communication. It is equipped to handle a wide range of inquiries, including those about application status, payment details, reasons for ineligibility, and any recent updates or modifications to the scheme. Furthermore, the chatbot is programmed to provide personalized responses based on the specific details of each beneficiary, ensuring that the information is relevant and tailored to individual circumstances. This AI chatbot will serve as a comprehensive guide and a reliable source of information, significantly simplifying the process of navigating the scheme and helping beneficiaries to make informed decisions about their involvement in PM KISAN.

Launch of Kisan e-Mitra Chatbot:

Kisan e-Mitra Chatbot was launched and made available to the public on 21st Sep 2023

Salient features of Kisan e-Mitra Chatbot

The AI-based universal interface cum chatbot for the PM KISAN scheme is a ground-breaking initiative in India, integrating various high-tech advancements for the first time to enhance user experience and accessibility. Here's an expanded overview, incorporating the additional features and collaborations:

a. **Multilingual Support:** In Phase I, the chatbot is available in five languages - Hindi, Tamil, Odia, Bangla, and English. In Phase II Malayalam, Marathi, Telugu, Punjabi, and Gujarati have been added, further enhancing its accessibility. For the first time in India, this chatbot leverages state-of-the-art technologies for speech-to-text, text-to-speech, and text-to-text translation. This integration allows the chatbot to provide answers in user-friendly languages and formats, showcasing a significant 'Made in India' achievement. Language support is made possible by leveraging advanced made in India AI language models' collaboration with Bhashini, Ai4Bharat centre at IIT Chennai.

b. **Advanced AI for Intent Recognition:** Utilizing sophisticated AI models, the chatbot is adept at extracting the intent from spoken questions. This capability ensures that the responses are accurately aligned with the user's inquiries, even when the questions are complex or phrased in different ways.

c. **Simplified User Interface:** Despite the underlying complexity, the user interface is designed to be simple and intuitive, effectively hiding the technical intricacies from the users and ensuring ease of use.

d. **24/7 Accessibility:** The chatbot offers real-time query resolution, powered by AI technology, ensuring that users can access information anytime.

e. **Reliable Source of Information:** With accurate and up-to-date information, the chatbot serves as a trustworthy guide for beneficiaries. This reliability is crucial in helping them make informed decisions and understand the nuances of the PM KISAN scheme.

f. **Accessibility across Multiple Platforms:** Accessible through the PM KISAN portal and mobile app, the chatbot supports both text and audio interactions, catering to user convenience and preference.

g. **Instant and Accurate Responses:** Beneficiaries receive prompt and precise answers to their queries, along with helpful suggestions. The chatbot also includes FAQ assistance for easy navigation through common questions.

h. **Options to provide feedback instantly:** System is designed to include feedback mechanism, allowing users to rate their experience or report issues. This feedback will be used for continuous improvement of the system.

I. **Designed for expansion:** The chatbot is designed to combine information across multiple sources. This enables PM Kisan E-Mitra to answer question combining various authentic sources of information.

j. **Data Security and Privacy:** Ensuring the confidentiality and security of beneficiary data is paramount. Hence only after verification of identity of the individual, relevant information is provided.

k. **Collaboration with Key Stakeholders:** The development and implementation of this chatbot involve collaboration with significant stakeholders, including Ekstep Foundation, Samagra Governance, Wadhwani AI and Bhashini. This collaboration brings together expertise from various fields, ensuring the chatbot is robust, efficient, and effective.

In conclusion, this AI-based chatbot for the PM KISAN scheme is a pioneering effort in India, combining advanced technologies and user-centric design to provide an unparalleled experience for beneficiaries. It stands as a testament to India's growing prowess in leveraging technology for social welfare and governance

Beneficiaries of Kisan e-Mitra Chatbot:

The Kisan e-Mitra Chatbot can be accessed by any citizen of the country and not just farmers to get overview of the Scheme.

1. Geographical Spread

i. Geographical spread at National Level

No of State(s) covered out of total 36 States and UTs *	All states & UTs
Percentage of States covered out of total *	100%

ii. Geographical Spread at state level

No of District(s) covered out of total 788 Districts *	All Districts
Percentage of Districts covered out of total *	100%

Target Audience:

All farmers, with a special focus on those who are not very adept with technology or have limited capacity to use digital devices extensively. Through the speech-to-text and text-to-speech functionality, it allows such users to easily ask queries and get accurate responses.

Technology Platform Used:

Description:

The Kisan e-Mitra Chatbot uses the latest technology being used in the field of AI chatbots. The chatbot has many beneficial features which can be easily used by the PM KISAN registered and other users such as multilingual answers, microphone for speaking rather than typing the query etc. The technology being currently used in the Kisan e-Mitra Chatbot is:

For the front end, the Chatbot is using ".Net" as its core technology while for the backend "NodeJS" is being used along ".Net". The database being maintained is in PostgreSQL and the APIs being used are "REST". The current application is a web app application. There is also an external integration with Bhashini for the various vernacular languages.

Technology Platform Used - Description:

The Kisan e-Mitra Chatbot leverages a sophisticated technology stack to provide prompt and accurate responses to farmers' queries while ensuring scalability and user friendliness.

1. **Natural Language Processing (NLP):**

   Utilizes NLP algorithms to understand and interpret user queries in both text and audio formats.

   Enables the chatbot to comprehend the diverse linguistic expressions used by farmers, contributing to a more natural and effective interaction.

2. **Machine Learning (ML) Models:**

   Incorporates ML models to facilitate self-learning and adaptability, allowing the chatbot to continuously improve its responses based on user interactions. Enhances the chatbot's ability to handle a wide range of queries and stay updated with evolving user needs.

3. **Speech-to-Text and Text-to-Speech Conversion:**

   Integrates speech-to-text and text-to-speech capabilities, enabling farmers to interact with the chatbot through both audio and text inputs.

   Facilitates accessibility for users with varying levels of literacy and technological proficiency.

4. **Bhashini Integration (National Language Translation Mission):**

   Integrates with Bhashini for language translation, ensuring multilingual support. Enables farmers to interact with the chatbot in their preferred language, overcoming linguistic barriers and enhancing inclusivity.

5. **Cloud Computing Infrastructure:**

   Hosted on cloud computing infrastructure to ensure scalability and accessibility. Allows the chatbot to handle varying levels of user demand efficiently and ensures reliable performance across different regions.

6. **Application Programming Interfaces (APIs):**

   Utilizes APIs for seamless integration with existing PM-KISAN systems, enabling the chatbot to retrieve real-time information about application status, payment details, and scheme updates.

   Ensures data accuracy and enhances the chatbot's effectiveness as a comprehensive guide for beneficiaries.

7. **User Authentication and Data Security Measures:**

   Implements robust user authentication mechanisms to safeguard sensitive farmer data.

   Adheres to stringent data security protocols, including encryption and regular security audits, to protect against unauthorized access and breaches.

8. **Web and Mobile Application Interfaces:**

   Provides user-friendly web and mobile interfaces for farmers to interact with the chatbot.

   Optimized for various devices and screen sizes, ensuring accessibility for a diverse user base.

9. **Feedback and Analytics Modules:**

   Integrates feedback modules to collect user insights and improve the chatbot's performance iteratively.

   Utilizes analytics tools like Google Analytics to monitor user interactions, identify trends and patterns, user traffic and assess the effectiveness of the chatbot in addressing farmer queries.

10. **Continuous Integration/Continuous Deployment (CI/CD):**

    Adopts CI/CD practices for agile development, allowing for frequent updates and enhancements without disruption to user access.

    Facilitates rapid deployment of new features and improvements based on user feedback and evolving requirements.

In summary, the Kisan e-Mitra Chatbot's technology platform is a synergistic blend of NLP, ML, cloud computing, language translation, and robust security measures. This comprehensive stack ensures the chatbot's adaptability, scalability, and effectiveness in delivering valuable services to farmers across diverse linguistic and technological backgrounds.

AI and ML-based grievance redressal system:

The AI-based grievance redressal system is a pivotal component of the Kisan eMitra. It addresses the limitations of the existing system by offering immediate, clear, and transparent responses to beneficiaries' issues, thereby improving satisfaction and trust. The system is capable of understanding and responding in the native languages of the beneficiaries, ensuring inclusivity and better service delivery.

1. The grievance redressal system will be able to respond to queries raised by beneficiaries related to the registration process, e-KYC process, beneficiary status, latest scheme details, and payment details.
2. The system will also suggest a possible work-around to the beneficiaries in case his/her issue is not resolved immediately.

   The grievance redressal system will be able to raise grievances in their native language

Impact and Future Prospects:

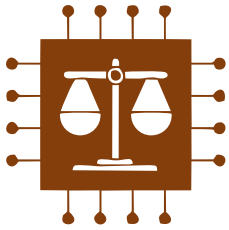
The introduction of the Kisan eMitra chatbot marks a significant advancement in the use of AI in governance. By providing 24/7 assistance and personalized user experiences, it bridges the gap between the government and the farmers, ensuring that benefits reach the intended recipients efficiently. By allowing farmers to seamlessly resolve their issues related to account status and updation, it ensures that they become eligible to receive the intended benefits of PM KISAN Scheme and pursue their farming needs. The phased development and expansion of the chatbot's capabilities and language support promise even greater inclusivity and effectiveness in the coming future.

Conclusion:

The Kisan eMitra chatbot exemplifies the transformative potential of AI in governance. It addresses critical issues in the PM KISAN scheme, ensuring timely assistance, improving user experience, and catering to the diverse linguistic needs of Indian farmers. As AI technology continues to evolve, its integration in public service delivery systems like PM KISAN will undoubtedly enhance governance, making it more responsive, efficient, and inclusive.

CHAPTER 13

Role of AI in Improving Local Governance in Rural Areas- A comprehensive overview



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Abstract:

The use of Artificial Intelligence (AI) and Machine Learning (ML) has a great potential to transform the local governance, especially in rural regions where resources are typically few and administrative issues are more obvious. This comprehensive overview explores the many ways in which AI technologies are used to enhance governance, expedite public service delivery, and assure transparency and accountability in rural India. AI/ML has helped a lot in one of the major flagship schemes of rural India i.e. Pradhan Mantri Awaas Yojana.

Gramin (PMAY-G), in terms of decision-making, resource allocation, and quality assurance. It also played a vital role in implementation of Area officer system designed for inspection of other initiatives of Rural India on ground.

Index Terms – AI in Governance, Viksit Bharat, E-Service Delivery, National Conference, Area Officer System, Rural Housing, Artificial Intelligence, Machine Learning.

Introduction:

Local administration in rural/remote locations are facing several obstacles such as restricted access to resources, geographical isolation, low levels computer literacy of citizens and other similar problems, which impacted the successful implementation of schemes of rural India. However, use of AI/ML technologies is helping to bridge these gaps by giving tools for more efficient and transparent management. This study looks at how AI/ML is being applied in various rural government programs, with an emphasis on the Area Officer System and the PMAY-G program, among others.

AI in Rural Governance: A Broad Spectrum.

AI/ML technologies are being used in several critical areas of rural governance mentioned as below:

- **Data gathering and Analysis:** Artificial intelligence systems enable the gathering and real-time analysis of massive volumes of data, allowing for more informed decision-making.
- **Predictive Analytics:** Machine learning models are forecasting trends and consequences, which helps officials to use resources more efficiently.
- **Quality Assurance:** Artificial intelligence algorithms is monitoring the quality of public services and infrastructure, assuring compliance with standards and discovering opportunities for improvement.
- **Citizen Engagement:** AI-powered systems enable citizen input and engagement, improving transparency and accountability.

Case Study 1: Area Officer System

The Area Officer System1, launched by Ministry of Rural Development (MoRD) and developed by National Informatics Centre, is an AI-powered platform for monitoring and evaluating the implementation and performance of government schemes. In MoRD, senior officers' visits at least once in two months to her/his assigned states to hold review meeting and experience implementation of schemes at the field level. The AI

enabled Area Officer platform enables all officials (Centre/State/Local) to plan and manage their visits, select worksites and assets for inspection, and record their findings in real-time. This also allow the officials to record time stamped and geotagged photographs and evidence of the schemes and helps hassle-free reporting of worksite inspection and evaluation.

Enablement of AI in Area Officer System helps in recommendation of inspection sites based on MIS data, feedback of citizens, response of officers and other parameters, the system recommend officers about worksites or public assets that should be visited for assessment. Officer can also view all the nearby public assets or worksites on map. He can get the complete details and direction to reach at the desired worksite. Reviewing Officers can capture evidence-based record and data on real time. The System is featured with capturing time stamped geotagged photographs for evidence where officers can also highlight anything in the image if they want.

The System is also featured with analytical dashboard for the stakeholders to look into the whole of the holistic performance location wise, scheme wise or in policy formation. Harnessing AI/ML algorithms, the system highlights potential quality gaps and funding delays, catalyzing awareness, and swift interventions.

In the system, citizens can give feedback on public assets and demand for inspections too. any citizens can register into the platform through the mobile app and monitor the real-time status of

assets and services across all integrated schemes. they can provide feedback and proffer recommendations for targeted inspection areas. The AI-enabled system does sentiment analysis on the feedbacks provided by citizens and system also utilized these feedbacks for prioritizing worksite inspections.

Case Study 2: Pradhan Mantri Awaas Yojana—Gramin (PMAY-G)

The PMAY-G 2initiative is envisaged to offer pucca house to rural poor. Since the inception of PMAY-G, lot of work has been done in e-governance front, however, there was no AI based digital tool for monitoring and ensuring the authenticity, quality, durability, completeness, and livability aspects of the house. To eliminate such gap and prevent any malpractices related to house construction following features are introduced in form of "AI enabled House quality assurance system.

I. Quality Assurance: Manual checking of photographs before release of money has been eliminated. AI enabled recommendation system has been placed which recommends cases for approval/rejection of completed house.

   The objective of this project is to revolutionize the monitoring and ensuring the authenticity, quality, durability, completeness, and livability aspects in the PMAY-G and other 50+ rural housing schemes by implementing an AI-enabled system. Focused on ensuring the fulfillment of essential parameters like Pucca Roof, Pucca Wall, Door, Window, the Scheme Logo in each completed house and ensuring presence of beneficiary and authenticity of the site, the solution aims to elevate the overall living standards in rural areas. By leveraging artificial intelligence, this is a robust, efficient, and reliable framework.

   It addresses the critical need for a streamlined and technologically advanced quality assurance process for the more than 3 Crore houses targeted under PMAY-G and other rural housing schemes. The earlier manual inspection & review methods were time-consuming and prone to human error, potentially overlooking essential aspects of compliance. The current AI-enabled system offers a comprehensive solution, harnessing the power of AI/ML to enhance the accuracy, efficiency, and transparency of the quality assessment process.

II. Geography based image analytics-based machine learning models for recommending results for local housing designs.

III. Predictive Maintenance: Machine learning models detect probable structural faults, allowing for preventive maintenance.

IV. Resource Optimization: AI-powered analytics assist in the best allocation of resources and personnel, lowering costs and increasing efficiency.

V. Beneficiaries' presence at site and liveliness is being ensured at the time of photo capture itself.

Case Study 3: Pradhan Mantri Gram Sadak Yojana (PMGS-Y)

Pradhan Mantri Gram Sadak Yojana (PMGSY) 3is a nationwide plan in India to provide good all-weather road connectivity to unconnected villages. The integration of Artificial Intelligence (AI) in PMGSY has significantly enhanced the planning, implementation, monitoring, and maintenance of rural road infrastructure. The eMARG (Electronic Maintenance of Rural Roads under PMGSY)4 platform is an initiative to enhance the maintenance of rural roads constructed under the Pradhan Mantri Gram Sadak Yojana (PMGSY) by leveraging technology. Integrating Artificial Intelligence (AI) into eMARG has further revolutionize the system, ensuring more efficient, cost-effective, and timely maintenance of rural roads. This AI-enabled platform has automated the inspection of road construction using sensors and image recognition to detect defects and ensure compliance with standards.

In coming days, the use of AI models in the system shall predict potential road failures based on historical data and current conditions, allowing for proactive maintenance. The environmental impact of road construction shall also be measured through AI enabled system and shall suggest mitigation measures to minimize adverse effects. Use of AI shall also assist the contractors, engineers and policy makers in identifying and using sustainable construction materials that reduce the carbon footprint.

AI-Powered Recommendation Systems:

AI-based recommendation systems are critical components of these programs, delivering data-driven insights to support decision-making system. It examines several data points, such as historical data, real-time feedback, and environmental conditions, to choose the best course of action. This functionality is especially useful in resource constrained contexts, since it ensures that limited resources are allocated where they are most required.

Challenges and Considerations:

Despite the advantages, the use of AI in rural government has some challenges too such as:

- **Internet issues:** Limited internet access and digital literacy can reduce the efficiency of AI-based solutions.
- **Data Privacy and Security:** Large volumes of data are collected and analyzed, raising privacy and security issues.
- **Scalability:** Ensuring that AI solutions can be scaled across varied and geographically scattered rural regions presents a substantial issue.
- Digital literacy rate in rural India
- Lack of norm and standard of using AI across all the diverse areas of application of AI Limited compute resource, data, talent, and regulatory and procurement capacity

Conclusion:

The use of AI/ML in rural governance has enormous potential for improving public service delivery, increasing transparency, and empowering individuals. Initiatives like Area Officer System and PMAY-G exemplify how new technologies can change traditional governance systems. As artificial intelligence evolves, governments must handle the problems and capitalize on the potential given by emerging technologies in order to promote sustainable and inclusive rural development.

This paper proposes for a strategic approach to integrate AI into rural government, highlighting the need of infrastructure development, capacity building, and legal frameworks to support these efforts. The insights obtained from the ongoing programs can help other areas of scheme and upgrade their public administration systems using AI and digital technology.

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CHAPTER 14

Effectiveness of E-Governance in engaging citizens for sustainable development under PM SVANidhi

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Abstract:

Government and governance are increasingly becoming digital to achieve economic, social, and environmental goals. However, reaching non-skilled and non-educated vulnerable sections remains a challenge, especially in a nation still grappling with poverty and vulnerability. This raises the question: how can we achieve sustainability without reaching the largest part of our population? This research paper examines the PM SVANidhi scheme, a government initiative designed for vulnerable street vendors, and demonstrates the success of e-governance in fostering sustainable livelihoods and development. By leveraging technology, the scheme has made significant strides in improving access to government services, enhancing socio-economic conditions, and promoting environmental stewardship among street vendors. Through a qualitative case study approach, this paper showcases how e-governance can effectively contribute to sustainability by providing inclusive, efficient, and transparent services to all citizens, regardless of their educational or skill level.

Keywords: Standards, Testing, Certification, Online portal, TEC

Introduction:

In the quest for sustainable development, e-governance emerges as a powerful ally, transforming the way governments interact with citizens. Imagine a world where essential services are just a click away – permits, taxes, social benefits, all accessible online. This is the promise of e-governance, ensuring that everyone, regardless of their location or status, can reach the services they need. E-governance eliminates the delays and paperwork, making government services faster and more efficient, much like a well-oiled machine.

E-governance is not just about technology; it's about creating a seamless, integrated experience for citizens. It uses data analytics to understand and meet individual needs, ensuring that progress and development reach every corner of society. In this digital age, e-governance stands as a beacon of hope, driving sustainable development and making the world a better place for all.

Sustainable Development:

Sustainable Development is a comprehensive approach to growth and development that aims to meet the needs of the present without compromising the ability of future generations to meet their own needs. It balances economic growth, environmental stewardship, and social inclusion to ensure long-term sustainability.

- **Economic Growth:** Ensuring inclusive and sustainable economic development by creating accessible opportunities for all, especially marginalized groups, and promoting innovation, industrialization, and infrastructure.
- **Environmental Protection:** Reducing pollution, managing waste, and combating climate change to sustain natural resources and ecosystems essential for human well-being.
- **Social Inclusion:** Promoting equal access to opportunities and resources, addressing disparities, and ensuring universal availability of education, healthcare, and basic services to build a more inclusive society.

E-Governance:

Governance encompasses a set of structures and processes aimed at ensuring accountability, transparency, responsiveness, adherence to the rule of law, stability, equity, inclusiveness, empowerment, and broad-based participation, as defined by UNESCO (United Nations Educational, Scientific and Cultural Organization). It is characterized by principles advocated by UNESCAP (United Nations Economic and Social Commission for Asia and the Pacific), which include being participatory, consensus-oriented, accountable, transparent, responsive, effective, efficient, equitable, inclusive, and adhering to the rule of law (UNESCAP). [1]

E-government, as defined by the OECD (Organisation for Economic Co-operation and Development), involves the use of Information and Communications Technologies (ICTs), particularly the Internet, to enhance government operations. This includes improving efficiency, service delivery, public trust, and overall capabilities to achieve specific and broad government objectives (OECD, 2003). [2]

E-governance initiatives can be broadly categorized into four types:

1. **Government to Citizen (G2C):** This involves services like transportation, education, and healthcare. It focuses on delivering public services directly to citizens, enhancing their accessibility and efficiency.
2. **Government to Government (G2G):** This includes initiatives like E-secretariat, E-police, and E-courts, aimed at improving inter-governmental processes and communication to streamline operations and reduce bureaucratic delays.
3. **Government to Business (G2B):** This encompasses services such as E-taxation and electronic transactions, facilitating smoother interactions between the government and the business community, thus fostering a conducive business environment.
4. **Government to Employee (G2E):** This involves initiatives like E-learning methods for government employees, focusing on improving their skills and knowledge to better serve the public.

But how is this e-governance truly useful for consumers or citizens?

E-governance platforms enhance citizen access to various public services online, such as applying for permits, paying taxes, and registering for social services, eliminating the need to visit government offices. They increase transparency by providing easy access to information about government activities, budgets, and policies, and improve accountability through features for citizen feedback and complaints. Digital platforms boost efficiency and speed by automating routine tasks and minimizing bureaucratic delays and errors. They also promote citizen engagement by facilitating participation in decision-making processes through online consultations, surveys, and forums, as well as live streaming and recording public meetings and hearings. Additionally, e-governance platforms lead to cost savings by reducing travel, paperwork, and administrative overhead, and by enabling secure digital payment options, reducing the need for cash transactions. Finally, they improve service delivery by integrating multiple services and departments, offering a seamless user experience, and using data analytics to provide personalized services tailored to individual needs.

Most definitions of e- governance today includes inclusive and participatory decision-making, accountability, and transparency as its key institutional characteristics. These characteristics have been enshrined as targets under SDG 16 on “Peace, Justice and Strong Institutions” that are not only considered desirable outcomes but also as enablers of all other SDGs. How the e-governance creates sustainability?

There are various components which come across in the way to sustainability that makes it easier to achieve through e-governance.

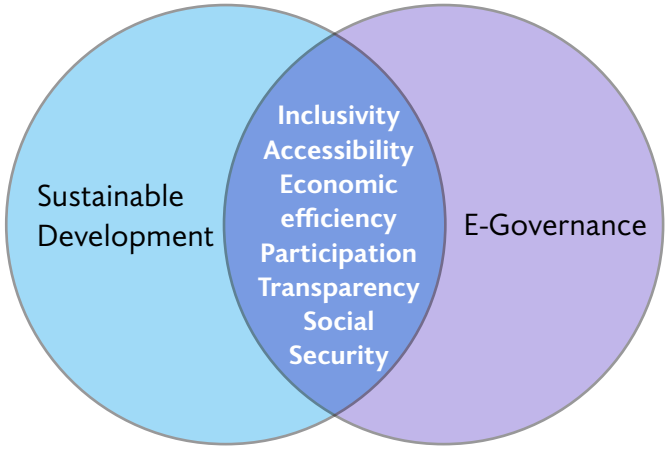


Figure 1: Venn diagram illustrating the common aspects through which e-governance supports sustainable development

Inclusivity and Accessibility Both sustainable development and e-governance ensure all sections of society benefit from progress and services. Sustainable development provides equal access to education, healthcare, and clean water. E-governance enhances access to public services through online platforms, allowing convenient access for all citizens.

Efficiency and Convenience Efficiency and convenience are central to both sustainable development and e-governance. Sustainable development promotes efficient resource use, minimizing waste and maximizing productivity. E-governance streamlines administrative processes, reducing time and effort for tasks like permits and taxes, minimizing delays, and improving service delivery.

Transparency and Accountability Transparency and accountability are shared principles. Sustainable development advocates for fair and just governance with active public participation. E-governance increases transparency by providing online access to government activities, budgets, and policies, and includes feedback mechanisms for consumer input.

Engagement and Participation Both emphasize citizen engagement and participation. Sustainable development involves diverse stakeholders in decision-making to reflect community needs. E-governance facilitates participation through online consultations, surveys, and forums, giving consumers a voice in governance and keeping them informed.

Cost Savings and Economic Efficiency Cost savings and economic efficiency are integral. Sustainable development creates inclusive economic opportunities and promotes responsible consumption. E-governance reduces administrative and travel costs by offering online services and digital payment options, making government services more affordable and efficient.

Improved Service Delivery Improved service delivery is a common goal. Sustainable development aims to provide high-quality, sustainable services enhancing well-being. E-governance offers integrated services across government departments, providing a seamless experience and using data analytics to meet consumer needs efficiently.

Objective:

This research paper aims to elucidate how e-governance fosters sustainability, using the PM SVANidhi scheme as a case study. Study has the following objectives:

- To illustrate how the digitalization of government services can lead to significant socio-economic upliftment for street vendors.
- To explore how digital platforms can holistically promote economic growth, social inclusion, and environmental stewardship.
- To assess the role of technological innovations in enhancing the reach and effectiveness of the PM SVANidhi scheme.
- To explore the ways in which e-governance fosters greater citizen participation and engagement in government schemes

Methodology:

The methodology of this research paper is anchored in qualitative analysis, utilizing a case study approach to explore the impact of e-governance on sustainability through the PM SVANidhi scheme. Case studies are a type of qualitative research where the researcher deeply examines a program, event, activity, process, or one or more individuals. These cases are defined by specific time frames and activities. Researchers gather detailed information through various data collection methods over an extended period.

Data was collected through a combination of participant observations, and document analysis, allowing for a comprehensive understanding of the scheme's implementation and effects. This qualitative methodology enables an exploration of the nuanced ways in which e-governance initiatives contribute to economic growth, social inclusion, and environmental protection, providing rich, contextual insights into the real-world implications of digital governance on sustainable development.

The Transformative Journey with the special case study of PM SVANidhi:

The journey from fields to factories and from rural to urban areas is not merely about migration; it is a story of transformation. From 1991 to 2019, the percentage of employment in agriculture decreased from 63% to 43%. This shift signifies a move towards higher productivity urban jobs in the secondary and tertiary sectors. However, this evolving urban landscape has also seen the informal sector expand, now employing around 80% of workers. [3]

The informal sector faces significant challenges in digital skills and adoption, making it difficult to introduce e-governance services to this segment of the population. It is required to create bond of G2C and G2B with these informal employees which will help them to be in touch with all the digital services to smoothen their life and businesses. As said by UN "The informal economy which carries significance in many countries is also increasingly digital and capturing the contours of digital informal economy is necessary to shape best-fit economic policies and strategies." [4]

PM SVANidhi and its components contributing to E-governance to create sustainable development:

The Ministry of Housing & Urban Affairs has effectively utilized digital infrastructure to uplift urban street vendors through the Pradhan Mantri Street Vendor's AtmaNirbhar Nidhi (PM SVANidhi) scheme. Launched on June 1, 2020, as a pandemic relief measure, PM SVANidhi initially offered collateral-free working capital loans up to Rs. 50,000 to help street vendors restart their businesses. The scheme has since evolved to empower vendors to expand their enterprises and enhance their economic growth [5].

The PM SVANidhi scheme not only provides credit facilities but also promotes digital adoption among street vendors, bridging the digital divide and improving their access to government services.

Highlights of the scheme

- Eligibility for all the street vendors from all urban areas
- Hassle-free loan application process through the PM SVANidhi portal
- Better investment environment through provision of loans in three tranches
- Enabling good repayment habits by providing 7% interest subsidy
- A sense of identity and security through Parichay Board
- Digital transaction push through cashback up to ?1,200
- Social security through 'SVANidhi se Samriddhi' (SSS)

This scheme promotes digital inclusion at every stage, from issuing letters to providing loans and training. Further it can be seen that how this scheme enhanced itself with the support of e-governance system setup. Its e-governance services contribute to following categories:

Government to Citizen (G2C)

- The scheme uses a **demand-based identification system** through a Letter of Recommendation (LoR), simplifying the loan application process. A system-generated request is sent to Urban Local Bodies for the issuance of LoR, based on the lender's recommendation after verifying the applicant's credentials. This online system enables real-time identification of street vendors and reduces documentation.
- Mobile App has been launched for the PM SVANidhi portal to access all the facilities. Street vendors find it easier to use the mobile app to apply for the scheme independently throughout the entire process.
- The scheme's SVANidhi se Samriddhi component focuses on the holistic development of beneficiaries and their families by integrating with eight central welfare schemes. A **mobile app-based survey** is conducted for socio-economic profiling, and eligibility checks are performed through integrated software. Eligibility details are communicated to partner ministries via **API integrations**, streamlining the sanctions process across schemes. The SSS portal provides a transparent overview of the scheme's progress.
- All beneficiaries of the PM SVANidhi scheme are authenticated 100% via Aadhaar.
- API Integration for CM Dashboard has been developed for over five states for performance monitoring and assessment, providing access to detailed information about all state beneficiaries and their statuses.
- A new digital dashboard offers a 360-degree view of the scheme, encompassing all vendors, lending institutions, and Urban Local Bodies (ULBs).
- Digital campaigns and drives have been conducted for training and onboarding beneficiaries.

Government to Business (G2B)

- An end-to-end IT digital infrastructure has been established, minimizing human intervention. Key components include the PM SVANidhi, SVANidhi se Samriddhi, and PAiSA portals, mobile applications, API integrations, real-time e-KYC through Aadhaar systems, QR codes with sound boxes, digital payment training, and incentivization for street vendors.
- The PM SVANidhi portal integrates with the banking system, allowing vendors to apply for loans directly at their preferred bank branches. The publicly accessible dashboard monitors real-time scheme performance, displaying key indicators such as the number of loans, beneficiaries, and digitally active street vendors.

- Aadhaar-based e-KYC has streamlined loan processing by bypassing the need to consider credit history, crucial as 95% of street vendors lack any credit history. The PAiSA portal provides a centralized platform for processing interest subsidies, directly transferring amounts to beneficiaries' bank accounts.
- Strategic collaborations with digital payment aggregators like PhonePe, Paytm, and India Post Payments Bank facilitate digital onboarding and training for vendors. Street vendors receive annual cash incentives up to INR 1,200, and banks & DPAs receive INR 300 per onboarding.
- The scheme collaborates with e-commerce platforms like Swiggy, Zomato, and ONDC, offering street vendors exposure to online marketplaces and opportunities for business expansion.
- AI solutions such as image enhancement and Amazon Image Recognition are used for the Parichay Board, which provides identity, security, and belongingness to street vendors, protecting them from unwarranted harassment by local authorities.

S.No.	Indicators	Impact numbers
1	Total Street Vendors	65 Lakhs
2	Total Digitally active Street Vendors	40% of total beneficiaries
3	Beneficiary onboarded via Aadhar Authentication	100%
4	ULBs onboard on digital platform	4800+
5	Total lending institutes onboarded	1.8 Lakhs
6	Total Applications Received (engagement with the system)	1 Crore

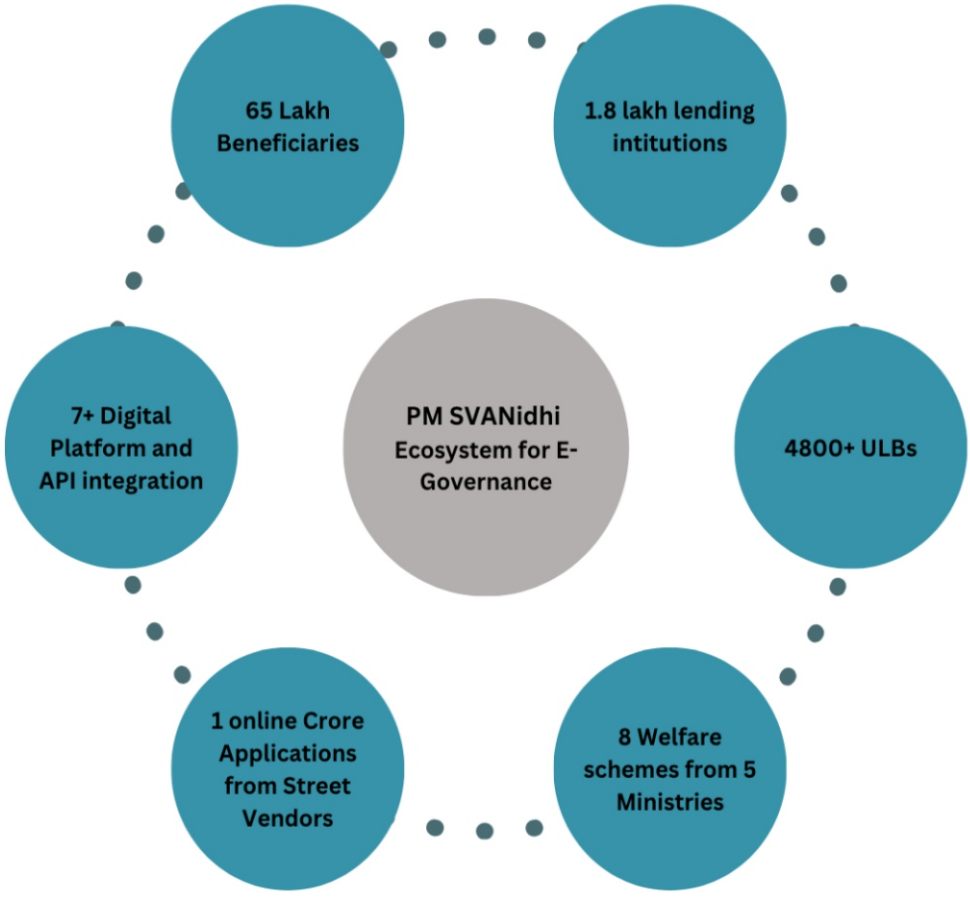
Table 1 Impact Number of the PM SVANidhi Scheme for digital inclusion

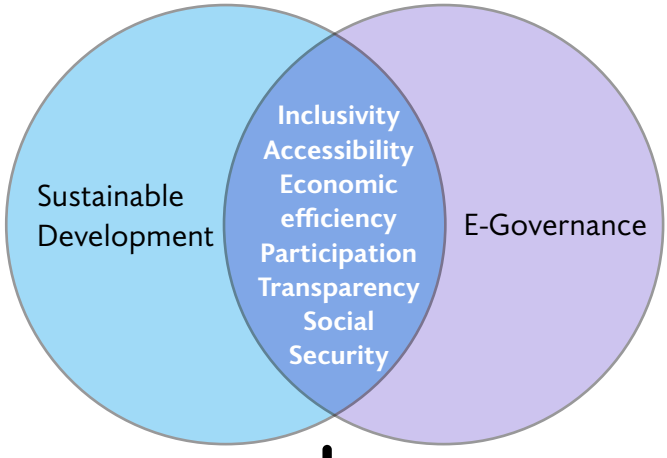
The PM SVANidhi scheme provides a compelling example of how e-governance can create sustainability, particularly in the context of urban livelihoods.

- Streamlining Processes and Reducing Bureaucracy: The PM SVANidhi scheme simplifies the loan application process with an online, demand-based identification system through a Letter of Recommendation (LoR), reducing documentation and administrative overhead for

street vendors. This identification of vendors through digital methods helps in creating digital identity. Digital economy is based on digital identity (ID) and untapping its potential is key to inclusive growth. Good digital identification has the potential to release value of between 3-13% of GDP.

- Integration with Central Welfare Schemes: The SVANidhi se Samriddhi component integrates PM SVANidhi with eight central welfare schemes, using mobile app-based socio-economic profiling and API connections for eligibility checks, promoting holistic development and transparency.
- Digital Infrastructure and Financial Inclusion: The scheme's IT infrastructure, including the PM SVANidhi portal and real-time e-KYC through Aadhaar, ensures transparency and efficiency. Integration with the banking system allows direct loan applications and real-time monitoring of scheme performance.
- Promoting Digital Payments and Reducing Cash Dependency: Collaborations with digital payment aggregators facilitate the onboarding and training of street vendors, promoting financial inclusion and economic sustainability through reduced cash dependency and annual cash incentives.





PM SVANidhi

Efficient use of resources and Inclusivity	←	Online system enables real-time identification
Secure and stable environment	←	AI for Parichay Board ensuring identity, and protection from harassment
Transparency and accountability	←	PAiSA portal for processing interest subsidies
Financial inclusion and enhancing economics sustainability	←	Collaborations with digital payment aggregators
Digital adoption and economic resilience	←	Annual cash incentives for vendors
Digital marketplaces supports sustainable economic growth	←	Collaborations with e-commerce platforms
Comprehensive development of vulnerable section with transparency	←	Holistic development and economic profiling through SSS portal

- **Enhancing Market Access and Business Opportunities:** Partnerships with e-commerce platforms like Swiggy and Zomato provide street vendors access to online marketplaces, expanding their business opportunities and supporting sustainable economic growth.
- **Ensuring Security and Belongingness:** AI solutions like image enhancement and Amazon Image Recognition for the Parichay Board offer street vendors identity, security, and protection from harassment, fostering a secure business environment.
- **Creating Data for ease of services:** Data cuts across the full spectrum of roles and responsibilities of governments. It is a critical input for sustainable consumption and production and will determine comparative advantage of economies.

The PM SVANidhi scheme fosters sustainability by targeting urban poverty alleviation among vulnerable street vendors and their families. It achieves holistic development and socio-economic upliftment through inclusive measures and integration with various welfare schemes. The issuance of a Certificate of Vending (CoV) at registration formalizes vendors' status, providing them with legitimacy and protection.

A survey data indicates significant positive impacts [6]:

- 34.6% of respondents reported substantial business improvement, while 28.2% noted moderate improvements.
- 57% experienced better interactions with government and bank officials post-registration.
- 44% observed a decrease in harassment from other vendors and shopkeepers.
- Four-fifths (79.5%) of the digitally equipped street vendors started using digital transactions from 2020 onwards
- Since 2016, the year-on-year growth in digital payment acceptance has been increased

These figures illustrate a transformation in how street vendors are perceived and treated by society and authorities, receiving increased respect and validation. Also, how their belief towards digital transactions has increased. Moreover, 'SVANidhi se Samriddhi' program links beneficiaries to additional welfare schemes, enhancing their overall well-being, financial security, healthcare access, and social benefits. This integrated approach empowers street vendors, enabling them to leverage a range of government initiatives and support mechanisms, thus promoting sustainable socio-economic development.

Conclusion:

PM SVANidhi scheme exemplifies the transformative power of e-governance in promoting sustainable development. By leveraging online platforms to issue vendor certificates, connect vendors with lending institutions, and create profiles for additional welfare benefits, the scheme ensures that street vendors receive timely and efficient support. This approach reduces bureaucracy, enhances transparency, and fosters financial inclusion, ultimately contributing to the socio-economic upliftment of one of the most vulnerable sections of society. The use of an online demand-based identification system, digital payment training, and strategic collaborations with financial and e-commerce platforms has promoted financial inclusion and economic sustainability. The positive impacts - ranging from improved business conditions to better digital adoption to better interactions with authorities and reduced harassment - highlight the scheme's success in validating and empowering street vendors. As PM SVANidhi continues to integrate digital solutions with welfare initiatives, it not only streamlines service delivery but also builds a more inclusive and resilient economy.

Through PM SVANidhi, e-governance proves to be a powerful tool in driving sustainable development, ensuring that even the most vulnerable sections of society can thrive in a digitally empowered environment. It demonstrates a commitment to efficient, economic, and sustainable methods, thereby enhancing the overall well-being and dignity of street vendors across India.

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CHAPTER 15

Smart Governance Unleashed: A Dynamic Multi-Index Framework and Dashboard to Evaluate and Monitor the Sustainability of Government Schemes and Reforms

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Abstract:

In the realm of sustainability assessment, in dices are pivotal for evaluating various dimensions of sustainability. This paper presents a research framework for developing an online configurable multi-index dash board designed to monitor and evaluate sustainability effectively. By integrating multiple sustainability indices into a single, user-configurable platform, the proposed dashboard aims to provide a comprehensive and flexible tool for stakeholders to assess sustainability performance across various dimensions and scales. This paper discusses the conceptual framework, technical architecture, and potential impacts of such a dashboard, alongside a case study to illustrate its application.

Keywords: e-governance, Dashboard, Monitoring, Evaluation, Multi Index, Reforms

Introduction:

The growing complexity of sustainability challenges necessitates advanced tools for effective monitoring and evaluation. Traditional methods often involve isolated or static measures, which may not adequately capture the multifaceted nature of sustainability. An online configurable multi-index dashboard offers a dynamic solution by integrating various sustainability indices into a single interface, allowing users to customize their views and analyses based on specific needs and preferences. This paper explores the development of such a dashboard, de tailing its design, functionality, and benefits.

Literature Review:

Concept of Sustainability Indices:

Sustainability indices are tools used to quantify and as sess various aspects of sustainability, including environ mental, economic, and social dimensions. Examples include the Environmental Performance Index (EPI), Human Development Index (HDI), and Social Progress Index (SPI) (Hsu et al., 2020; Sachs et al., 2019). These in dices provide standardized measures that facilitate com parisons and decision-making.

Need for Configurable Dashboards:

Configurable dashboards offer flexibility in data visualization and analysis, allowing users to tailor their views according to specific requirements [Few, 2006]. In the context of sustainability, such dashboards can integrate multiple indices, providing a comprehensive view of performance and enabling customized assessments [Schroeder et al., 2018]. This capability is crucial for stakeholders who need to monitor diverse aspects of sustainability and make informed decisions based on integrated data.

Existing Solutions and Limitations:

Current online tools and dashboards for sustainability of ten focus on single indices or lack of configuration [Kirk, 2016]. While tools like the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB) provide valuable data, they do not offer the flexibility to combine multiple indices or customize dash boards for specific needs [Bebbington et al., 2014]. The development of a configurable multi-index dashboard ad dresses these limitations by offering a more integrated and adaptable solution.

Methodology:

Requirements Analysis:

The first step involves conducting a requirements analysis to identify the key functionalities and features needed for the dashboard. This includes consultations with stake holders, such as policymakers, sustainability experts, and end-users, to gather their needs and preferences.

Design and Architecture:

Conceptual Framework: The dashboard is designed to integrate multiple sustainability indices into a unified interface.

Key components include:

- **Data Integration:** Aggregating data from various indices and sources.

- **Customized Views:** Allowing users to configure their dashboard views based on selected indices, time periods, and geographical regions.
- **Interactive Features:** Providing tools for data exploration, filtering, and visualization.

Technical Architecture:

The technical architecture includes:

- **Front end:** A web-based interface using technologies such as HTML5, CSS3, and JavaScript frame works (e.g., React, Angular).
- **Back end:** A server-side application for data pro cessing and storage, using technologies like Laravel, Node.js or Python Flask.
- **Database:** A relational or NoSQL database for storing index data and user configurations.
- **APIs:** Integration with external data sources and indices through APIs.

Implementation:

The implementation phase involves:

- **Development:** Building the frontend and backend components based on the design specifications.
- **Testing:** Conducting usability testing, performance testing, and validation to ensure the dashboard meets user needs and technical requirements.
- **Deployment:** Launching the dashboard and providing training and support to users.

Case Study: Implementation in NITI Aayog[girg.gov.in]:

Overview:

To illustrate the practical application of the proposed dash board, we consider its implementation in NITI Aayog as it is the premium policy think tank setup for policy transformation by Government of India. NITI Aayog under the leadership and guidance of Cabinet Secretariat has envisaged measuring and monitoring performance of states and the nation's development and growth initiatives on various important social, economic and other parameters through internationally recognized indices.

The main goal is to use these Indices as tools for self-improvement and bring about reforms in the policies and pro cesses of government agencies and financial institutions

Major aspects of the dashboard:

- **Global Index:**

  There will be a module in the dashboard that will capture and show the scores and ranks of Global Indices and Parameters as published by the Publishing Agency in its report. This module will not have any inbuilt scoring and ranking mechanism. It will only display the manually entered scores and ranks at Global Index/Parameter level.

  This module is envisaged to help in understanding the overall performance of India in Global In dices and Parameters rankings and comparison of India's performance against other countries. The module will help in benchmarking targets, India plans to achieve to improve its international ranking.

- **India Index: Index organisation is depicted in Figure 1**

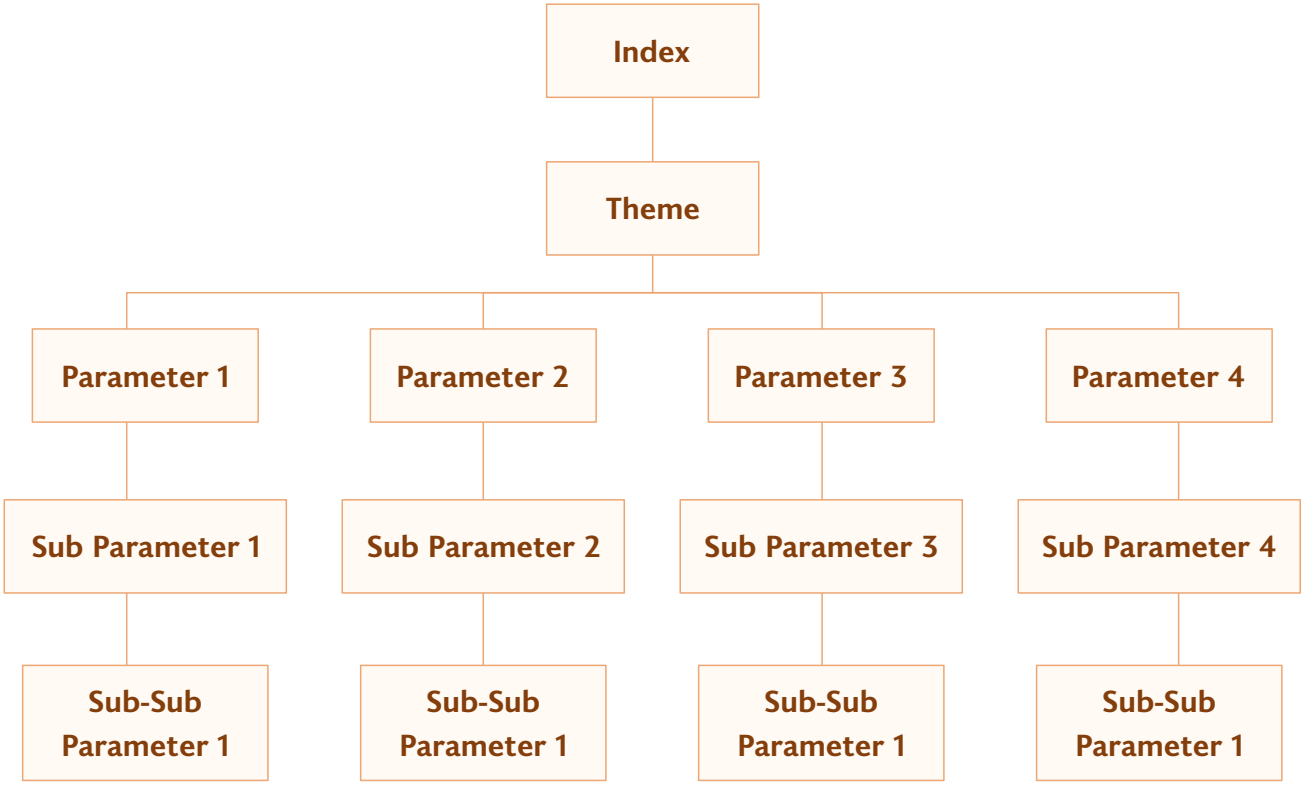

Figure 1 Index Hierarchy, dmeo.gov.in

- **Scoring and Ranking Procedure:**

1. For each Index, score of a State gets calculated within the system based on its progress data on the lowest abstraction level and the formula entered by the Nodal Ministry for the index. The formula for the index would be uniform across all states.
2. The national score for an Index will be calculated as a weighted average of scores of all states.
3. Normalized score values will also be visible on the dashboard. For parameters for which higher the value means better the performance:

$$X' = \frac{x\text{-}min(x')}{T(x)\text{-}min(x)} \times 100$$

Where: x': Normalised progress data value for a State min(x): Minimum progress data value among all States x: Raw data for State under consideration

T(x): Target value for the parameter

For parameters for which higher the value means lower the performance:

$$X' = \left[\frac{max(x)=x}{(X) - T(X)}\right] \times 100$$

x': Normalised progress data value for a State max(x): Maximum progress data value among all States x: Raw data for State under consideration

T(x): Target value for the parameter

- **Reform Areas and Actions:**

Additional Monitoring at State level for Reform Areas and Reform Actions (can be tracked on real time basis, as and when updated by the States)

To derive reforms and growth, the Reform Areas will be identified by the Nodal/Line Ministry on each Parameter. Further, for each Reform Area, there may be objective Reform Actions identified by Nodal Ministry in consultation with the Line Ministry/Department. The Reform Areas/Actions will also be mapped with each Ministry/Department/State for clarity on responsibility and tracking the progress update.

The progress on achievement/completion of Reform Actions will also be captured for each relevant Ministry/State, in the dashboard.

The above status/progress should be visible on the dash board to facilitate reviews. This status will be tracked based on 4 categories of progress status i.e., 'Completed', 'In progress', 'Yet to be initiated' and 'Overdue'. All the identified reform actions will be tracked based on this status. Additionally, each reform action may be classified as 'High', 'Medium' and 'Low' priority at the time of adding them so as to enable ease of tracking update on reform actions by the Line or Nodal ministry.

Scoring mechanism for Reform Actions:

1.The overall Score for Reforms will be calculated for a State and similarly for all States separately. The overall score will be a simple weighted average of all the reform actions. The States will be ranked on reforms based on the overall score calculated.

The priority will be defined based on the priority of the reform actions (with 'High' having weight 4, 'Medium' having weight 2, 'Low' having weight 1 and if 'Not feasible for current it' it will have weightage 0). If the reform action is complete, the Reform Action score will be considered as 3, in case of 'in-progress' it will be 1, in case of 'yet to be initiated' it will be 0 and in case of 'overdue' the value will be -1. In case certain reforms are not applicable to certain states, any inconsistencies will also be handled by the priority and reform action score.

Implementation Steps:

1. **Data Integration:** NITI Aayog can collaborate with data providers such as the World Bank, UNDP, and WIPO to integrate data into the centralized database. APIs can be used to automate data collection where possible. Initially the data was collected through the reports published.
2. **Dashboard Development:** Using an open-source platform like Laravel framework, the dashboard is developed with a focus on user-friendly design and robust data visualization capabilities using front end and charting libraries. Main Modules of the system are depicted in figure 1 below.

Figure 2 Dashboard Modules]9

An important aspect in such multi index dashboard is to provide a mechanism for configurable formula definition in easy to use UI and the in-built mechanism to calculate score and ranking based on these formulae. A calculator like UI for Formula Editor was proposed and after user feedback on wireframe as mentioned in figure 3 was developed and integrated in the system.

Figure 3 Formula Editor UI, User Manual, girg.gov.in

Authorised users of any formula-based index will define formula for all intermediate levels for an Index for calculation of scores. Formula will be created using formula editor which will have the below functionalities in terms of opera tors, operands and other features. There may be different formulas in each year. So, formula editor will have the flexibility to define formulas year wise.

Formula editor will have a list of operators, operands to de fine a formula and save it for a particular year. As per the defined formula, scores for the intermediate levels of Index tree will be calculated for a particular year. This score is then displayed in the scoring screen of the formula module. The score of Index and intermediate levels will be available once user goes to that level through a drill down navigation.

1. **Pilot Testing:** A pilot version of the dashboard was tested with select policymakers and researchers within NITI Aayog. Feedback was collected and used to refine the dashboard.
2. **Training and Deployment:** Training sessions were conducted for all potential users, and the dashboard was deployed on a cloud infrastructure to ensure scalability and reliability.
3. **Continuous Improvement:** The dashboard was continuously monitored and updated with new data and features based on user feedback and emerging requirements.

FINDINGS:

Benefits of the Configurable Multi-Index Dashboard:

1. **Enhanced Flexibility** The configurable nature of the dashboard allows users to customize their views and analyses based on their specific needs. Users can select relevant indices, adjust time periods, and focus on particular geographical areas [Schroeder et al., 2018].
2. **Comprehensive Assessment** Integrating multiple indices into a single platform provides a holistic view of sustainability performance. Users can compare different indices and assess how various dimensions of sustainability inter act [Hsu et al., 2020].
3. **Improved Decision-Making** The dashboard supports informed decision-making by providing interactive tools for data exploration and visualization. Stakeholders can analyze trends, identify patterns, and make data-driven decisions enabling predictive modeling and forecasting [Few, 2006].
4. **Increased Accessibility** As an online tool, the dashboard is accessible from various devices and locations, facilitating widespread use and collaboration among stakeholders [Kirk, 2016].

Challenges and Limitations:

1. **Data Integration Complexity** Integrating data from multiple indices and sources can be com plex and requires careful management of data quality and consistency [Bebbington et al., 2014]. Establish clear indicators and metrics such as poverty reduction, education, and cli mate action.
2. **User Training and Support** Users may need training to effectively use the dashboard and interpret the data. Providing adequate support is essential for maximizing the dashboard's bene fits [Few, 2006].
3. **Technical Maintenance** Ongoing maintenance and updates are required to ensure the dashboard remains functional and up-to-date with new data and indices [Schroederetal.,2018)]

Conclusion:

Evolving with minor customization of such online con figurable multi-index dashboard represents significant sustainability in monitoring and evaluation. By integrating various sustainability indices into a single customized platform, the dashboard offers enhanced flexibility, com prehensive assessment capabilities, and improved decision-making support. It enhances the ability to track progress, identify areas for improvement, and implement effective policies. The proposed methodology and key features ensure that the dash board is comprehensive, user-friendly, and capable of providing real-time insights. While challenges such as data integration complexity and user training exist, the benefits of the dashboard in providing a holistic and accessible tool for sustainability assessment are substantial. Future work should focus on refining the dashboard based on user feedback and expanding its functionality to accommodate emerging sustainability indices and data sources like data from various sources, including sensors, surveys, and existing databases.

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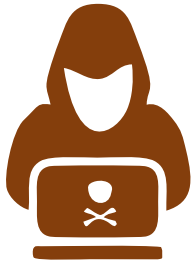
CHAPTER 16

Sanchar Saathi: An AI-Powered Collaborative Initiative to Combat Cybercrime and Financial Fraud



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Abstract:

Sanchar Saathi, an AI-powered collaborative initiative of Department of Telecom (DoT), aims to combat cybercrime and financial fraud. The platform empowers citizens to identify and disconnect unauthorized mobile connections, report and block lost phones, report suspected communication and verify the authenticity of devices. The initiative also involves various stakeholders, including law enforcement agencies, financial institutions, banks, OTTs, social media etc. to create a synergistic framework for information sharing and rapid response to cyber threats. SS is powered through indigenous digital intelligence engines built on Artificial Intelligence and Facial Recognition powered Solution for Telecom SIM Subscriber Verification (ASTR) and other data analytics tools are running which proactively generate digital intelligence to find out the suspected fraudulent mobile connections operating across India. The vision of the Sanchar Saathi project is to ensure a robust digital ecosystem, instill confidence in citizens using digital services, and enhance the digital economy. By fostering collaboration among the Ministry of Home Affairs, the Department of Telecommunications, banking systems and the public, Sanchar Saathi seeks to build a resilient and secure environment for citizens to protect against cybercrime and financial fraud.

Keywords: Sanchar Saathi, Digital Intelligence Platform, ASTR

Introduction:

Background:

The past three decades have seen a significant revolution in Information and Communication Technology (ICT), with mobile phones and telecom at the heart of this transformation. What began with voice calls has expanded to encompass vast data consumption, instant messaging, social media platforms, internet banking, and on-the-go payment transfers through Unified Payment Interface (UPI), banking apps, and other payment apps. According to Telecom Regulatory Authority of India (TRAI) Telecom Subscription Data Reports as of March 31, 2024, [3] there are approximately 116 crore mobile subscribers in India. However, the increased use of technology has also opened up opportunities for fraudsters to exploit gaps in the digital ecosystem, leading to cybercrime and financial frauds through the misuse of mobile phones and the internet. Fraudsters exploit human greed and fear to situations to extort money from citizens. According to the latest trends of cybercrime as shown in Figure 1, cybercrime has increased by roughly 20 times from 2012 to 2022.

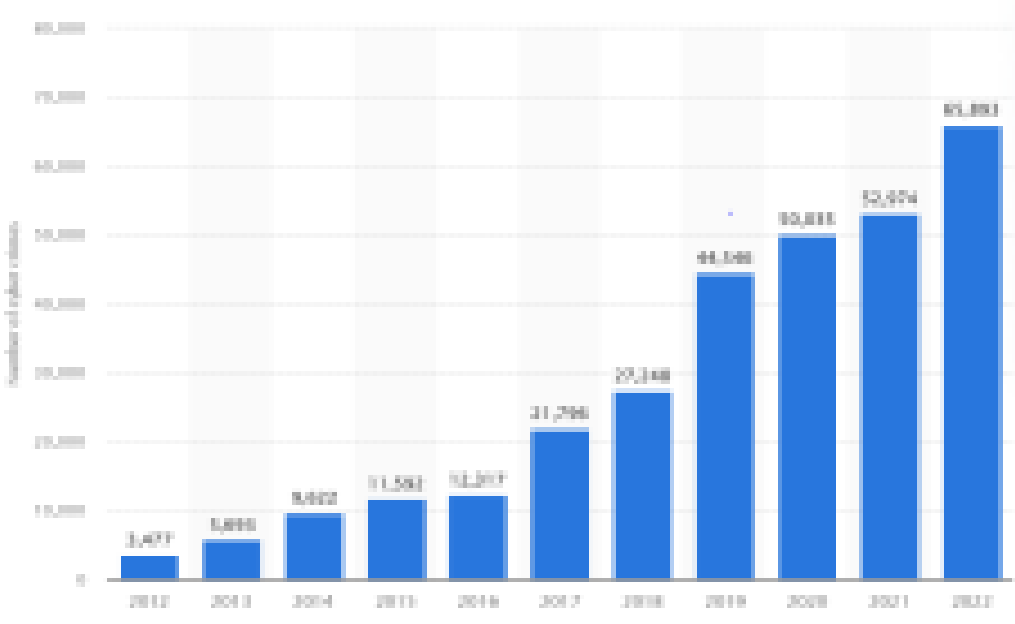


Figure 1 – Number of Cybercrimes Reported Across India from 2012 to 2022 [2]

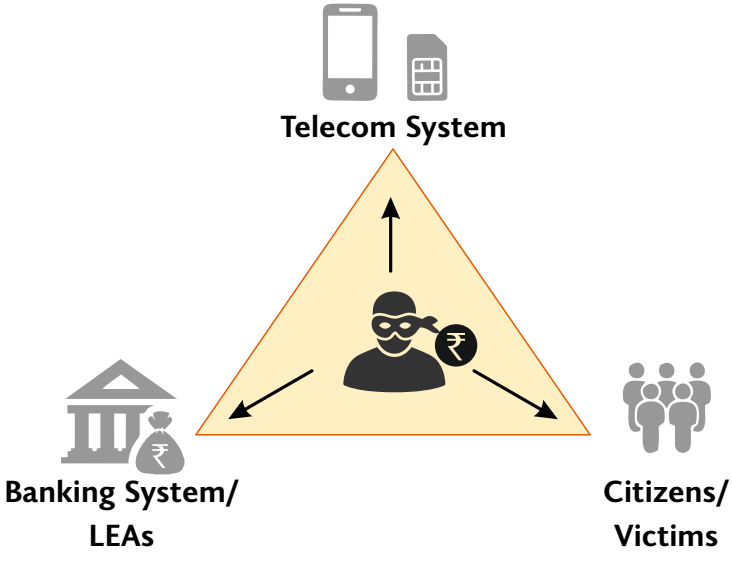
Challenges:

Anonymity and Untraceability of Fraudsters:

The malicious actors carry out cybercrime and financial frauds by concealing their identities by acquiring mobile connections with fake or forged identity documents. This anonymity and untraceability make such connections susceptible to misuse in various cybercrimes, including spoofed calls, threat calls, lottery scams, One Time Password (OTP) frauds, fake job offers, financial duping through re

The triad exploited by fraudsters:

As shown in Figure 2, cyber fraud revolves around the interconnected triad of the telecom network, banking system/ Law Enforcement Agencies (LEAs), and the citizen. Fraudsters exploit these three systems to perpetrate crimes. However, this exploitation by the fraudster can be converted into opportunity to mitigate cybercrime by getting hold of the criminal by working in synergy and timely information sharing, these systems can effectively combat cybercrime and financial fraud.



Fraudster exploits the system

Multijurisdictional challenge:

Cybercrime and financial fraud often transcend geographical boundaries, involving perpetrators, victims, and resources from multiple jurisdictions. These issues are complex and require a multi-jurisdictional approach to solve the aforementioned problems of cybercrime and financial fraud. This complexity necessitates coordinated efforts from various stakeholders, including local and international law enforcement agencies, financial institutions, telecommunication providers, and regulatory bodies. Each jurisdiction may have different laws, regulations, and enforcement capabilities, making it challenging to track and apprehend cybercriminals who operate across borders. Collaboration between jurisdictions is crucial to share intelligence, track the movement of illicit funds, and identify and apprehend criminals. This includes harmonizing legal frameworks, developing joint investigation teams, and establishing mechanisms for rapid information exchange. Furthermore, cybercrime and financial fraud often involve sophisticated techniques and technologies that evolve rapidly.

A mult?urisdictional approach enables pooling of resources, expertise, and technological capabilities to stay ahead of cybercriminals. It also helps in addressing the legal and technical

challenges of investigating crimes that involve encrypted communications, anonymized transactions, and other methods used to conceal criminal activities.

Lost Mobile Phones:

The problem of lost or stolen phones is escalating. The market for lost or stolen phones is estimated to be worth around Rs 100 crore per month, with over 50,000 devices being lost or stolen each month. In summary, the complexity of cybercrime and financial fraud requires a coordinated, mult?urisdictional approach to effectively address these issues, leveraging the strengths and capabilities of different regions and organizations to protect citizens and maintain the integrity of the digital ecosystem

Initiatives to Tackle Cyber Crime Related Challenges and Their Impact:

DoT has created an ecosystem to curb the misuse of telecom resources by integrating different components like TAFCOP, CEIR, Chakshu, ASTR, DIP under the umbrella of Sanchar Saathi [1]. this is shown in the Figure 3.

Cyber Crime Related Initiatives:

There are two scenarios which may exist in a cybercrime:

1. The cybercrime has already occurred: In the event of a financial cyber fraud, victims can dial the helpline number 1930 or report the incident on the National Cybercrime Reporting Portal (www.cybercrime.gov.in), provided by the Indian Cybercrime Coordination Center (I4C), Ministry of Home Affairs (MHA) [4]. The first 30 minutes after the crime, often referred to as the "golden hour," are critical. Prompt reporting allows for manual intervention, acting as a kill switch to halt the transaction and effectively prevent the cybercrime from being completed. However, this system requires more collaborative efforts from the MHA, DoT, banking systems, FIU, and citizens to become robust. The goal is to develop an automated system that detects cybercrimes as they occur and verifies transactions in real-time with the actual owner of the bank account involved and return to the victim.

2. There is an attempt to commit cybercrime by the fraudster: Whenever there is an attempt at cyber fraud, such as a hoax call, SMS or WhatsApp message containing phishing links, or suspicious emails, and the victim recognizes it as fraudulent without falling for the scam, timely reporting of these incidents can prevent others from becoming victims of the same scheme. This is where Sanchar Saathi's module, **Chakshu: Reported Suspected Fraud Communication (SFC)**, becomes handy. Reporting such incidents helps the government identify potential scammers, their mobile numbers, locations, and the devices they use, as well as detect patterns in their fraudulent activities.

Impact of Chakshu:

- Around 500 complaints are received on Chakshu every day. Based on the complaints numerous actions are taken by DoT.
- WhatsApp accounts linked to mobile numbers misused for carrying out cyber-crimes/ financial frauds against Indian citizens, through impersonation as Government officials, are being disengaged by DoT in collaboration with WhatsApp.
- Various Principal Entities (PEs), involved in sending malicious and phishing SMSs to the citizens have been blacklisted, numerous SMS content templates associated are deactivated and complaints are registered.
- Mobile handsets which are used in such incidents are blacklisted.
- The suspected mobile numbers are flagged for re-verification to the Telecom Service Providers (TSPs) and subsequently are disconnected failing re-verification

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Initiatives to Empower the Citizens:

In response to these challenges, the Sanchar Saathi portal has been developed as a citizen-centric initiative to curb cyber fraud, empower mobile subscribers, enhance security, report suspected communication and assist in reporting and tracing lost phones. The portal also aims to increase awareness about government initiatives for citizen protection. Since its launch a year ago, Sanchar Saathi has gained attraction with a total of 4.5 crore visitors. Till May 2024, around 70 lakh requests have been received for disconnections by citizens, either as Not My Number or Not Required on 'Know Your Mobile Connections' (TAFCOP) module out of which 60 lakhs have been resolved. Further, under Report Your Lost/Stolen Mobile Handset (CEIR) 16 lakh requests have been received for blocking Lost/Stolen Mobile out of which 9 lakh mobile handsets have been and flagged to State Police and 1.32 lakh mobile handsets have been recovered by the State Police and returned to citizens.

Sanchar Saathi empowers citizens by enabling them to identify mobile connections issued in their names, disconnect unauthorized connections, report and block lost mobile phones, and verify the authenticity of devices when purchasing new or used phones. The vision of the Sanchar Saathi project is to ensure a robust digital ecosystem, instil confidence in citizens using digital services, and thereby boost the digital economy.

Collaborative Initiative: Digital Intelligence Platform (DIP)

Sanchar Saathi, through its Digital Intelligence Platform (DIP) is engaging various stakeholders, including LEAs, financial institutions (FIs), banks and wallets, UIDAI (Unique Identification Authority of India), Reserve Bank of India (RBI), social media platforms like WhatsApp, etc. to create a collaborative framework, as demonstrated in Figure 4 for real time, online intelligence and information sharing. Mobile Number Revocation List (MNRL) i.e. Information regarding the mobile numbers which are being disconnected due to various reasons like DoT analysis- fake forged connections, LEA analysis, zero usage etc., which is valid for 90 days. After 90 days the number is realloted to another citizen. Further, such information of suspected numbers is shared by other stakeholders on the DIP. This collaboration aims to facilitate rapid responses to cybercriminal activities and enhance the overall security of the digital ecosystem.

Impact of DIP: The DIP was launched in March 2024. In 2 months from the date of launch, around 450 banks, FIs, MHA, UIDAI, IRCTC, DMRC, social media platforms have been onboarded on the DIP to facilitate intelligence sharing. An information of around 5 crore disconnected mobile numbers is shared on DIP. In return, banks and FIs have shared around 50,000 suspected numbers on which appropriate action has been taken. These efforts of DoT have been appreciated by all stakeholders who have provided feedback that it is effective in mitigating cybercrime in a proactive manner. By collaboration, the triad which is being misused by fraudsters (Figure 2) can become helpful in catching the fraudster (Figure 5).

Initiatives to Prevent Frauds due to fake/ forged documents

1. **Artificial Intelligence and Facial Recognition powered Solution for Telecom SIM Subscriber VeRification(ASTR):** ASTR is a powerful AI/ML-based facial recognition application designed to detect subscription fraud by analyzing images of telecom subscribers. It identifies and removes non-bonafide SIMs from the telecom ecosystem before they can be used for cybercrime. ASTR operates in the background of Sanchar Saathi, proactively eliminating mobile connections involved in cybercrime.

In India, SIM subscription can be done through three methods: physical paper-based Customer Acquisition Form (CAF), Digital Know Your Customer (KYC), and e-KYC using Aadhaar authentication. In paper-based and Digital KYC methods, there is no mechanism to validate the authenticity of the Proof of Identity (PoI) or Proof of Address (PoA) used by the subscriber. ASTR verifies the legitimacy of SIMs by analyzing images and producing results as follows:

a. **Image Processing:** It processes all submitted images (in paper CAF-based subscriptions) or live photos (in Digital KYC/e-KYC) using face detection techniques, creating embeddings of the images.

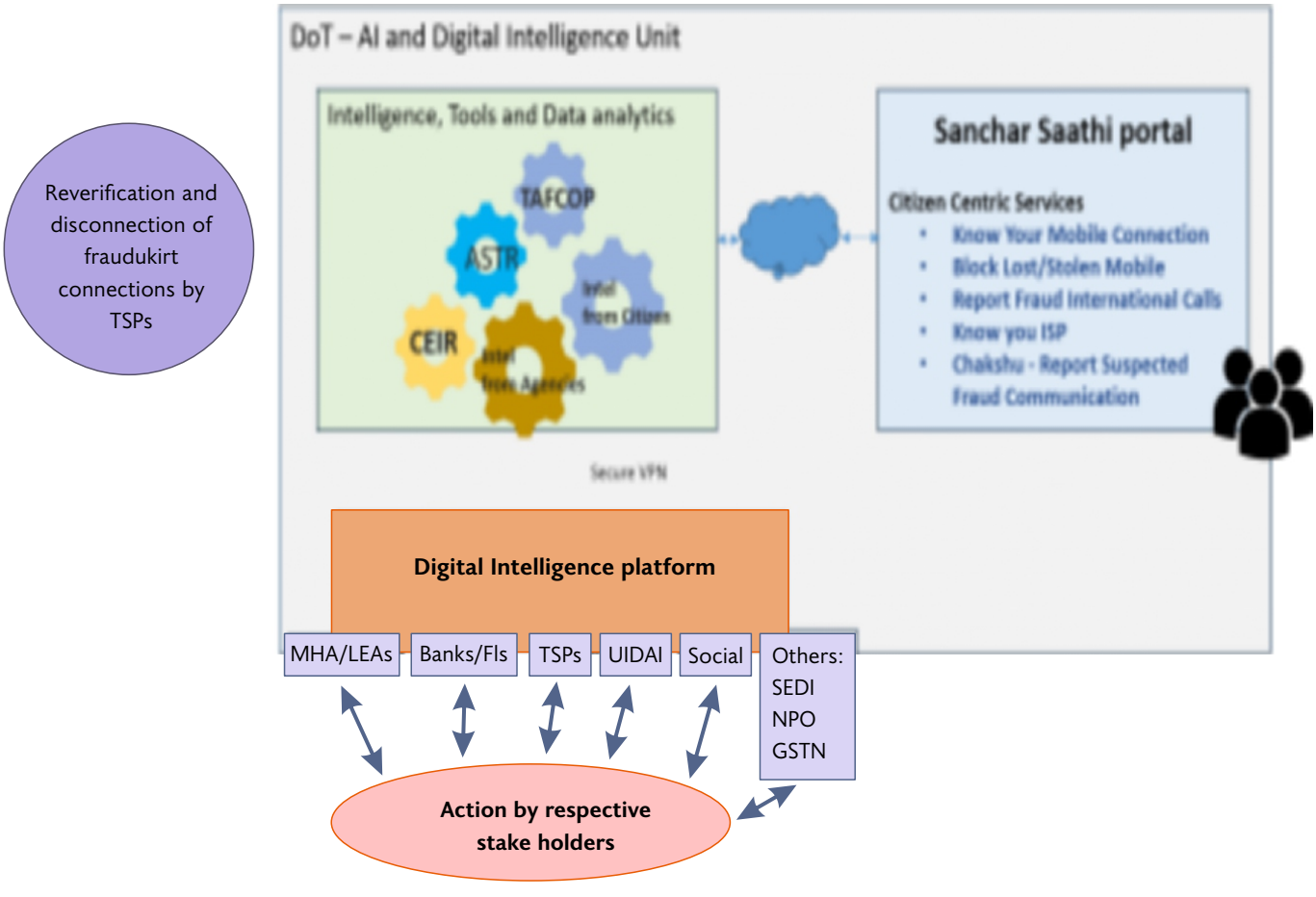

Figure 3 – Ecosystem of DoT to curb misuse of telecom resources

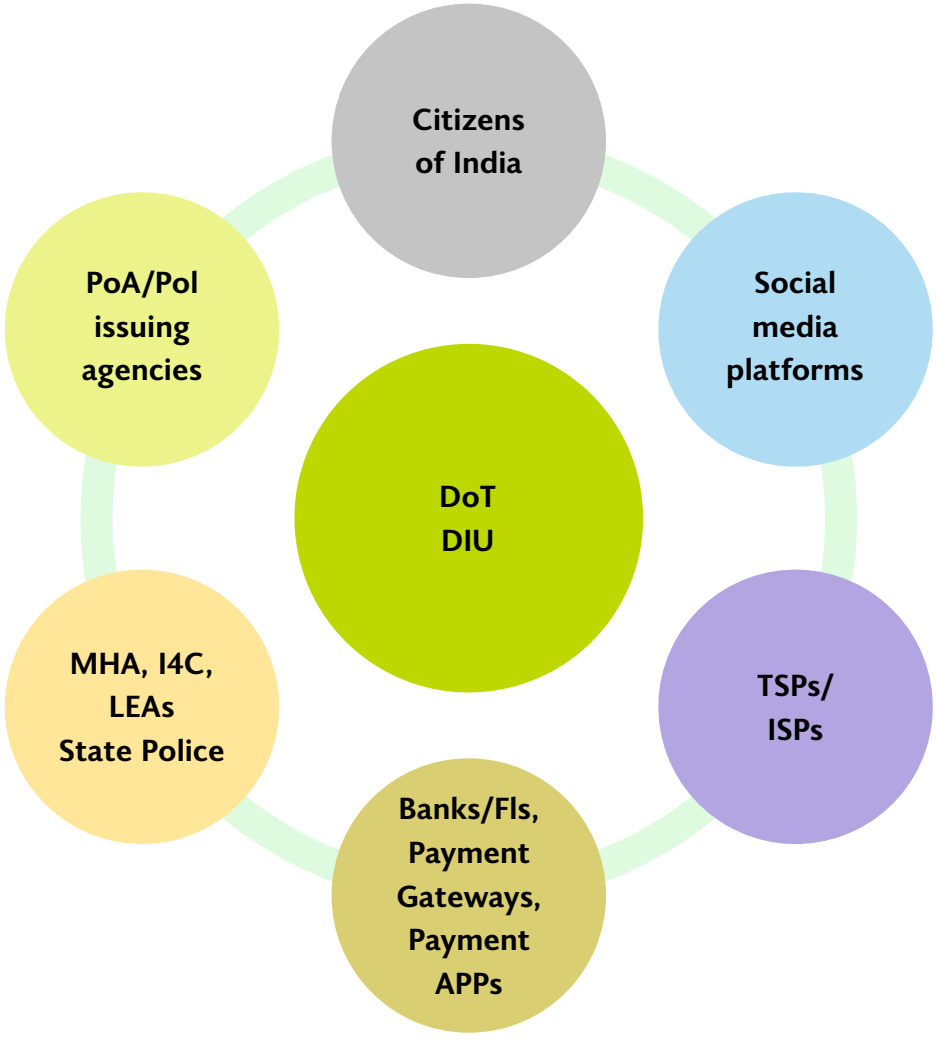

Figure 4 – Collaboration among stakeholders

b. **Image Matching:** These embeddings are then compared with those of other images to find faces belonging to the same individual.

c. **Text Analytics:** Fuzzy logic-based text analytics identifies mobile connections acquired using the same photograph but under different names. This helps detect instances where multiple SIMs have been obtained with the same photograph but different names using forged PoI/PoA documents.

The overall summary of the impact of ASTR across India is shown in the heatmap of India in Figure 6 Till May 2024, out of the total 134 crores analysed using ASTR, 67 lakh suspected connections have been detected, out of which 64 lakh mobile connections have been disconnected.

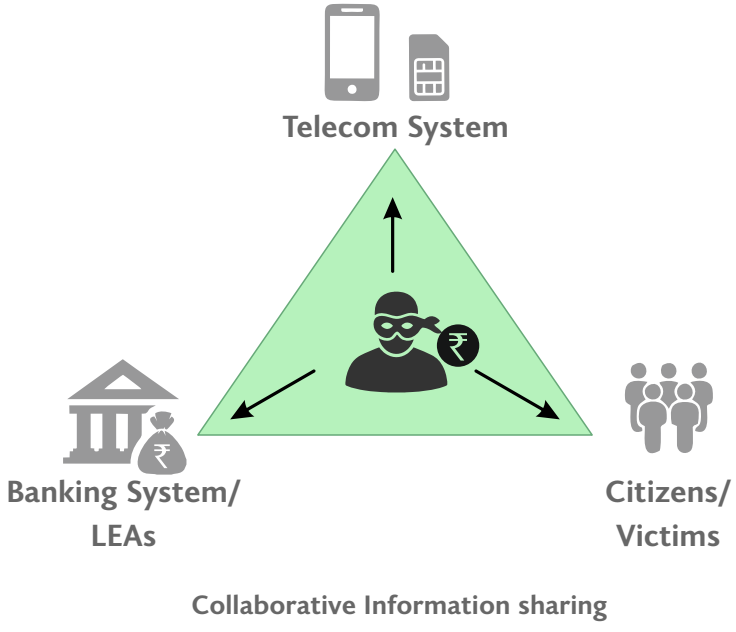

Figure 5 – Collaborative Efforts in Seizing Fraudsters

2. **Suspected SMS Communication based Analysis:** All commercial communication is governed by TRAI's Telecom Commercial Communication Customer Preference Regulation (TCCCPR) 2018 regulation [5]. TCCCPR protects customers from Unsolicited Commercial Communications (UCC) and allows principal entities to send messages to customers who have opted in. Malicious SMS are often sent using look-alike headers or 10-digit mobile numbers. The DoT analyzed mobile numbers linked to PEs, Registered Telemarketers (RTMs), and bulk SMS templates. Findings included single mobile numbers linked to multiple PEs, unconnected persons' numbers linked with PEs, disconnected numbers linked with PEs, and the same entity registered as both RTMs and PEs using the same number.

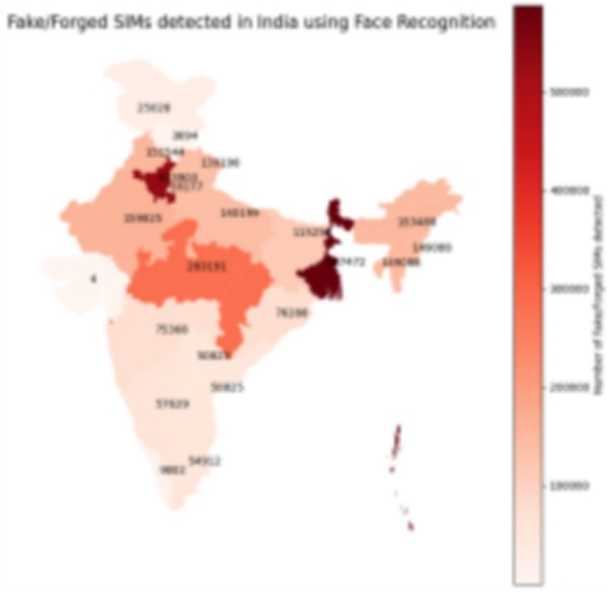

Figure 6 – Heat Map showing fake/forged SIMs found across India

3. **Mobile Handsets Based Analysis:** Using chain analysis, the devices which are using suspicious mobile numbers are identified and blocked. Till May 2024, around 1.9 lakh such mobile handsets have been identified and blocked pan India across all TSPs.

4. **Point of Sale (PoS) Analysis:** Some PoS agents issuing SIMs have been found using fake or forged documents. As direct representatives of TSPs, it's crucial for PoS to prevent the sale of fake SIMs. Agents selling fake SIMs to illegal migrants, malicious actors, or those involved in anti-national activities are being identified and blacklisted. This is essential, as preventing PoS from engaging in such activities stops customers from obtaining SIMs with fake documents, which contributes to cybercrime and illegal syndicates. The heat map of India showing such PoS is shown in Figure 7. Till May 2024, around 71,000 such PoS have been blacklisted across India.

5. **Pattern Based Analysis in Cybercrime Hotspots:** Patterns of working of cyber criminals have been identified. Few hostpots have been identified within the country from where organised cybercrime syndicates are operational. The numbers which belong to some other identified Licensed Service Area (LSA) and are operated in these hotspots have been marked as suspicious and sent for reverification. Till May 2024, around 2.4 lakh such mobile connections have been disconnected.

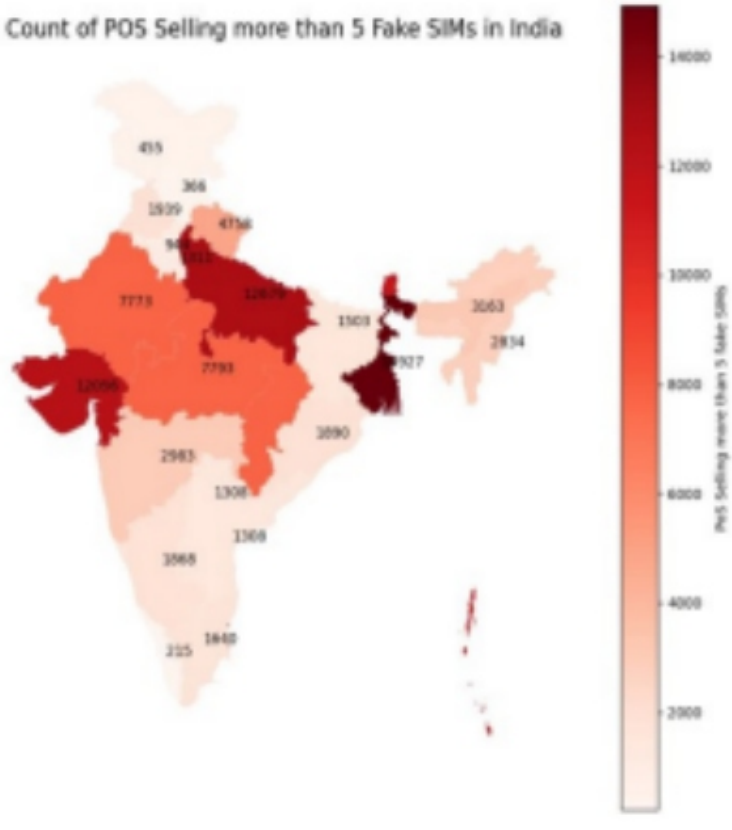

Figure 7 – Heat Map showing PoS Selling Fake SIMs across India

DISCUSSIONS

Sanchar Saathi plays a crucial role in empowering citizens by providing information on suspected fake or forged mobile connections, enabling them to block and trace lost phones, and verify the authenticity of mobile devices. This initiative significantly restores citizens' trust in governance, especially within the ICT and digital space. It has been instrumental in dismantling cybercrime syndicates in key hotspots across the country, thereby enhancing the safety and security of the digital payments ecosystem and reducing cybercrime and financial fraud. Sanchar Saathi has achieved a remarkable leap in efficiency, moving from a 0.1% random SIM audit to 100% verification, thus increasing operational efficiency by 1000 times. It supports law enforcement agencies in criminal investigations and identifying connections in cybercrimes, contributing directly to public safety and law and order. Furthermore, it fosters a collaborative ecosystem for intelligence sharing, allowing all stakeholders to access real-time information about disconnected mobile numbers and take proactive measures.

Conclusion:

A resilient and thriving digital future starts with the initiatives and efforts we undertake today. India's vision to become a trillion-dollar digital economy by 2026 depends on a secure and trustworthy digital space for its citizens. Given the short life cycle of SIMs involved in cybercrimes, typically less than a month, proactive and swift action is essential. Sanchar Saathi represents a bold step towards creating a robust and secure digital ecosystem for citizens. Sanchar Saathi envisages to further understand the gaps being exploited by the fraudsters to commit cybercrime and financial frauds and evolve accordingly, at a pace even faster than the evolving cybercrimes, with the help of predictive analytics. Sanchar Saathi is a dynamic system which will understand the patterns of cyber criminals and evolve according to the changing requirements. This strategy will help in reducing the problem of financial frauds and other crimes manifold. Sanchar Saathi has been successful, to a large extent, to contain cybercrime and in weeding out fraudulent mobile connections and fraudsters from the system. With the collaboration, continuous and focused efforts of all stakeholders like TSPs, OTTs, Police, financial institutions etc. we will be able to reduce cyber frauds in a proactive manner.

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CHAPTER 17

Cybersecurity and Emergency Response Readiness

Authors:

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Abstract:

Cybersecurity and emergency response readiness are critical and interconnected components for organizations to effectively manage and mitigate the impact of security incidents. Robust incident response planning, data protection and backup, business continuity measures, regulatory compliance, and cyber resilience strategies are key elements that enhance an organization's overall preparedness. Incident response plans outline the structured processes for detecting, responding to, and recovering from cyber-attacks and other disruptive events. Reliable data backup and recovery capabilities ensure critical information can be restored, enabling business operations to resume quickly. Maintaining business continuity during and after an incident is crucial for preserving an organization's reputation, customer trust, and market share. Aligning cybersecurity and emergency response plans with relevant regulations and standards demonstrates compliance and supports a stronger security posture. Integrating these disciplines as part of a comprehensive risk management strategy contributes to an organization's cyber resilience - the ability to withstand, adapt to, and recover from evolving threats. By addressing these key areas, organizations can improve their overall cybersecurity readiness and emergency response capabilities, minimizing the impact of security incidents and ensuring the long-term viability of the business. Continuous monitoring, employee training, and cross-functional collaboration are also essential for maintaining a robust and adaptable security framework.

Keywords: Cyber Security, Incident Response, Penetration Testing, Business Continuity Disaster Recover, Regulatory compliance etc.

Introduction:

Cyber security is protecting network, systems, software etc. from digital attacks. The goal of cyber security is defending information technology infrastructure from unauthorized access,

disclosure, Disruption, modification and destruction. It helps the digital systems safe from malicious users. Cyber Security layered defence approach strategy that involves combination of tools, process and practices to protect systems, network and data from attacks.

Key cybersecurity objectives include:

- **Confidentiality:** Ensuring that sensitive information is accessed only by authorized individuals or entities.
- **Integrity:** Maintaining the accuracy and completeness of data and systems.
- **Availability:** Ensuring that authorized users have reliable and timely access to information and resources.

Cybersecurity and Emergency Response readiness refers to an organization's preparedness and ability to effectively prevent, detect, respond to, and recover from cyber threats and attacks. It's not a one-time fix, but an ongoing process of building resilience against ever-evolving threats. Cybersecurity and emergency response readiness are critical components of an organization's overall risk management and resilience strategy. As the digital landscape continues to evolve, organizations must be prepared to rapidly detect, respond to, and recover from cybersecurity incidents that can disrupt operations, compromise sensitive data, and threaten public safety.

Emergency response readiness refers to an organization's ability to effectively prepare for, respond to, and recover from various types of emergencies, including natural disasters, accidents, and human-caused incidents. This involves: Incident Response Planning, Business Continuity, Disaster Recover etc.

Fig1: Cybersecurity and Emergency Response Readiness

Technical Defences Involved in Cybersecurity and Emergency Response Readiness:

Technical defences are the tools and technologies you use to create a layered security shield around your systems and data. They act as the first line of defence against cyberattacks, preventing unauthorized access, detecting suspicious activity, and mitigating damage. Here's a breakdown of some key technical defences in cybersecurity:

1. **Network security:** Network Layer attacks performed on the network layer of the OSI (Open Systems Intercommunication) model i.e. Layer 3. This focus on perimeter security of a network from unauthorized access. Firewalls, DDOs (Distributed Denial of Services), IPS (Intrusion and Prevention System) are examples of network tools.
   - These tools can be hardware device deployed in network or it can be software. Purpose of these tools is continuously monitor a network for malicious activity. It reports the activity, it may drop or block the activity depending upon the configuration of the device.
   - IP Spoofing, ARP Spoofing, Denial-of-Service (DoS) Attacks, Denial-of-Service (DoS) Attacks are network layer attacks.
2. **Endpoint security:** This protects individual devices like laptops, desktops, and mobile phones from malware, viruses, and other threats.
   - Anti-virus software, endpoint detection and response (EDR), and data loss prevention (DLP), use of Unified Endpoint Management (UEM) tools all examples of endpoint security solutions.
   - Common endpoint security attacks Malware, Phishing Attacks, Watering Hole Attacks, Zero-Day Attacks, Drive-by Downloads, threats by infected USB etc
3. **Application Security:** This focuses on protecting applications from vulnerabilities that could be exploited by attackers.
   - Using of Web Application Firewalls (WAF), secure coding practices, vulnerability scanning, and penetration testing are all important components of application security.
   - SQL Injection (SQLi), Cross-Site Scripting (XSS), Cross-Site Request Forgery (CSRF/XSRF), Buffer Overflow, Remote file Inclusion are example of Application Layer attacks.
4. **Data Security:** This ensures the confidentiality, integrity, and availability of data. Protects Sensitive Information, Prevents Data Tampering, Protects Company Reputation, Ensures Compliance, Maintains Business Continuity, Builds Customer Trust etc. Applying encryption to data at rest, in transit, and in use to protect sensitive information from unauthorized access.

- In case of passwords use the salted hashing technique while storing it in database, use SSL (Secure Sockets Layer) that encrypts the data being transmitted between a client (e.g., web browser) and a server using cryptographic protocols. This prevents eavesdropping and ensures that the data remains private and unreadable to unauthorized parties. Use strong encryption algorithm, strong ciphers, protocols etc.

5. **Authentication and Access controls:** This ensures that only authorized users have access to systems and data. Identity and access management (IAM) helpful to manage digital identities and control user access to critical resources within an organization. Multi-factor authentication (MFA), strong passwords, and role-based access control (RBAC) are all important aspects of IAM.
6. **Security Information and Event Management (SIEM):** Strengthening an organization's overall cybersecurity posture by providing real-time insights into potential threats. Improving emergency response readiness by enabling faster detection, investigation, and containment of security incidents. By leveraging SIEM effectively, organizations can significantly improve their ability to prevent, detect, and respond to cyberattacks.
7. **Physical Security:** Physical security measures like restricted access control, security cameras, and alarms deter unauthorized physical access to IT infrastructure. This makes it more difficult for attackers to gain physical access to devices and data, which can be a critical step in many cyberattacks. It reduces Attack Surface, Protection of Sensitive Assets, Improved Deterrence etc. Physical security defences include Access control, Surveillance, Biometrics, Perimeter security systems, Mass notification procedures, Facial recognition etc.
8. **Cloud Security:** It's important to remember that cloud security is a shared responsibility between the cloud service provider and the customer. The cloud provider is responsible for the security of the underlying cloud infrastructure, while the customer is responsible for securing their data and workloads within the cloud environment.

Processes involved In Cybersecurity and Emergency Response Readiness:

1. **SOC (Security Operations Center):** The Security Operations Center (SOC) plays a crucial role in an organization's cyber security readiness and overall security posture of the organization. Security Operations Center (SOC) is a critical component of an organization's cyber security strategy, providing comprehensive threat detection, incident response, vulnerability management, and proactive security measures to enhance the organization's overall security readiness and resilience.

2. **Strong Policies and Procedures:** These policies can reduce an organization's risk by training employees to avoid certain activities and can enable more effective incident response by defining protocols for detecting, preventing, and remediating them. Security policies are mandatory and enforceable. Anyone violating the policy could face disciplinary action. A security procedure is a step-by-step guide that explains how to achieve the security goals outlined in the policy. Some of the cyber security policies are IT Security Policy, Email Security Policy, BYOD (Bring Your Own Device) Policy etc. Password Management Guidelines, Incident Response Framework, Remote Work Guidelines, Data Backup and Recovery Procedures etc are example helpful in achieving organization policies. Ensuring that policies are regularly reviewed, updated, and communicated to all employees to maintain awareness and compliance. Security policies set the ground rules, while security guidelines offer practical advice on following those rules. Both works together to create a comprehensive security framework.

3. **Vulnerability Management:** Regularly identifying and patching vulnerabilities in systems and software. Vulnerability management involves continuously scanning and assessing an organization's IT infrastructure, including networks, systems, applications, and cloud environments, to identify security weaknesses and vulnerabilities. This allows the organization to gain a comprehensive understanding of its attack surface and potential entry points for cyber threats. Vulnerability management provides valuable insights into the organization's security weaknesses, which can inform and enhance its incident response and emergency preparedness plans. Many standards, such as GDPR (General Data Protection Regulation), HIPAA (Health Insurance Portability and Accountability Act), and PCI DSS (Payment Card Industry Data Security Standard), require robust vulnerability management practices to ensure the security and privacy of sensitive data.

4. **Penetration Testing:** Penetration testing, also known as pen testing or ethical hacking, is a simulated cyberattack conducted by authorized security professionals to identify vulnerabilities in an organization's systems, networks, and applications. Pen testing Identifies weaknesses that attackers could exploit to gain unauthorized access, steal data, or disrupt operations. By identifying these vulnerabilities beforehand, organizations can prioritize and patch them, significantly reducing their attack surface. Pen testing can assess the effectiveness of existing security controls like firewalls, intrusion detection systems, and access controls. This helps identify any gaps in the security strategy and allows for adjustments to strengthen defences. It helpful in preparing Emergency readiness by understanding the types of attacks that may occur and the vulnerabilities that could be exploited, organizations can develop more effective plans for responding to and mitigating security incidents.

5. **Incident Response Plan:** An incident response plan is a crucial component of an organization's cybersecurity strategy, outlining the procedures and steps to be taken in the event of a security incident or data breach. The main purpose of an incident response plan is-
   - **a.** Minimizes the impact of security incidents on business operations and reputation
   - **b.** Enables a structured and coordinated response, reducing recovery time and costs
   - **c.** Helps organizations comply with regulatory requirements and industry standards
   - **d.** Facilitates post-incident analysis and improvement of security measures
   - **e.** Enhances overall cybersecurity posture and resilience

1. **Data Backup and Recovery:** Effective data backup and recovery measures safeguard an organization's critical data against various threats, such as cyber-attacks, hardware failures, human errors, and natural disasters. This ensures that data can be restored and business operations can resume in the event of an incident. Protecting against Data Loss Enables the Rapid Recovery, Facilitating Incident Response, Mitigating Reputational Damage and also Enhancing Cyber Resilience.

2. **Business Continuity Disaster Recovery (BCDR):** Business Continuity Disaster Recovery (BCDR) is helpful for an organization's cybersecurity emergency response readiness. BCDR plans aim to maintain the continuity of essential business functions and processes during and after an emergency, reducing downtime and ensuring the organization can continue serving its customers. BCDR plans outline the processes and procedures for responding to and recovering from various types of incidents, including cyber-attacks, natural disasters, and system failures.

3. **Security Awareness and Training:** It empower the user and helpful to avoid failing victim of the common attack vectors. Training equips them to identify phishing attempts, suspicious emails, and social engineering tactics. It educates the user about the best practices for handling the sensitive data, browsing the internet safely, using of multi factor authentication, using of strong passwords etc. It Reduced panic, awareness training educates users on the importance of reporting suspicious activity promptly.

4. **Threat Intelligence:** Gather and analyse threat intelligence from various sources like industry reports, government advisories, and threat feeds. This helps them stay updated on the latest attack methods and vulnerabilities, allowing them to proactively strengthen defences against known threats.

5. **Conduct regular security assessment and audit:** Regular security assessments and audits are essential for building and maintaining a strong cybersecurity posture. By proactively identifying vulnerabilities and testing your emergency response plan,

organizations can significantly improve their readiness to prevent, detect, and respond to cyberattacks.

6. **Cyber Security frameworks:** Cybersecurity frameworks are invaluable tools for organizations of all sizes. By adopting a recognized framework and adhering to its principles, organizations can significantly improve their cybersecurity posture, enhance emergency response readiness, and ultimately protect their valuable data and systems from cyberattacks. Popular Frameworks in the field of cyber security is Cybersecurity Framework (CSF), ISO 27001 and ISO 27002, Canter for Internet Security (CIS) Controls, SANS Security controls etc.

Major Cyber Security Attacks:

1. **Advanced persistent threat (APT):** APT is a highly advanced, covert threat on a computer system or network where an unauthorized user manages to break in, avoid detection and obtain information for business or political motives. Typically carried out by criminals or nation-states, the main objective is financial gain or political espionage. Hackers will also install backdoor programs (likeTrojans) on compromised computers within the exploited environment.
2. **Command and Control Attack:** A command and control attack is when a hacker takes over a computer in order to send commands or malware to other systems on the network. In some cases, the attacker performs reconnaissance activities, moving laterally across the network to gather sensitive data. These types of attacks continue to grow in popularity, with the number of command-and-control servers (C2) increasing by a staggering 30% in 2022 alone. In other attacks, hackers may use this infrastructure to launch actual attacks. One of the most important functions of this infrastructure is to establish servers that will communicate with implants on compromised endpoints. These attacks are also often referred to as C2 or C&C (Command & Control) attacks.
3. **Credential Dumping:** Credential dumping simply refers to an attack that relies on gathering credentials from a targeted system. Even though the credentials may not be in plain text — they're often hashed or encrypted an attacker can still extract the data and crack it offline on their own systems. This is why the attack is referred to as "dumping." Often, hackers will try to steal passwords from systems they have already compromised. The problem becomes amplified when users replicate the same password across multiple accounts through multiple systems.

4. **Open Redirection:** Host redirection attacks are very common and increasingly subversive, as hackers become more creative about how they lure their targets. Attackers use URL (Uniform Resource Locator) redirection to gain a user's trust before they inevitably strike. Other major cyber security incidents are Ransomware attack, phishing and social engineering attack, Distributed Denial of service (DDos) attacks, data breaches and unauthorized access etc.

Time Line and History of Cybersecurity and Emergency Response Readiness.

Era	Event	Description	Impact on Cybersecurity and Emergency Response
1960s	Mainframe Computers and Early Hacking	Mainframe computers become more widely used, leading to increased security challenges. The term "hacking" is adapted to refer to unauthorized access to computer systems.	Discovered potential vulnerabilities.
1970s & 1980s	The Birth of the Internet & The Rise of Computer Viruses and Antivirus Software	The first computer virus, called Creeper, is created by Bob Thomas and can move between computers on ARPANET. The first antivirus program, called Reaper, is developed by Ray Tomlinson to detect and remove the Creeper virus.	The first computer viruses start to spread, leading to the development of the first commercial antivirus software.
1990s	The World Wide Web and New Security Threats	The World Wide Web has revolutionized how we access and share information, but it has also introduced new security threats that organizations and individuals must be aware of.	The World Wide Web is invented, leading to new security threats such as phishing, malware, Cross-Site Scripting (XSS), SQL Injection, Distributed Denial-of-Service (DDoS) Attacks, Social Engineering

Era	Event	Description	Impact on Cybersecurity and Emergency Response
2000s	Cyber Espionage and Cyber Terrorism	Cyber espionage, also known as cyber spying, is a type of cyber-attack where malicious hackers steal, damage, or expose classified data with the intent to harm an individual or organization, causing reputational destruction.	Cyber espionage and cyber terrorism become more prevalent, and new security technologies like firewalls and intrusion detection systems are developed.
2010s	Rise of the Internet	Increase in Cyber Attacks	The number and severity of cyber-attacks increased, including high-profile breaches of major corporations and government agencies.
2020s	Emerging Technologies and Cybersecurity Challenges	The rise of new technologies like artificial intelligence and the Internet of Things present new cybersecurity challenges.	Emerging technologies such as 5G networks, cloud computing, Internet of Things (IoT), Artificial intelligence (AI), Machine learning (ML), quantum computing, and edge computing have led to a sudden rise in expanded attack surfaces, Novel vulnerabilities, Increased complexity and interoperability challenges, Regulatory and compliance concerns, Talent and skill shortages etc

Table.1: Table showing the Time Line and History of Cybersecurity and Emergency Response Readiness.

Phases in Cybersecurity and Emergency Response Readiness

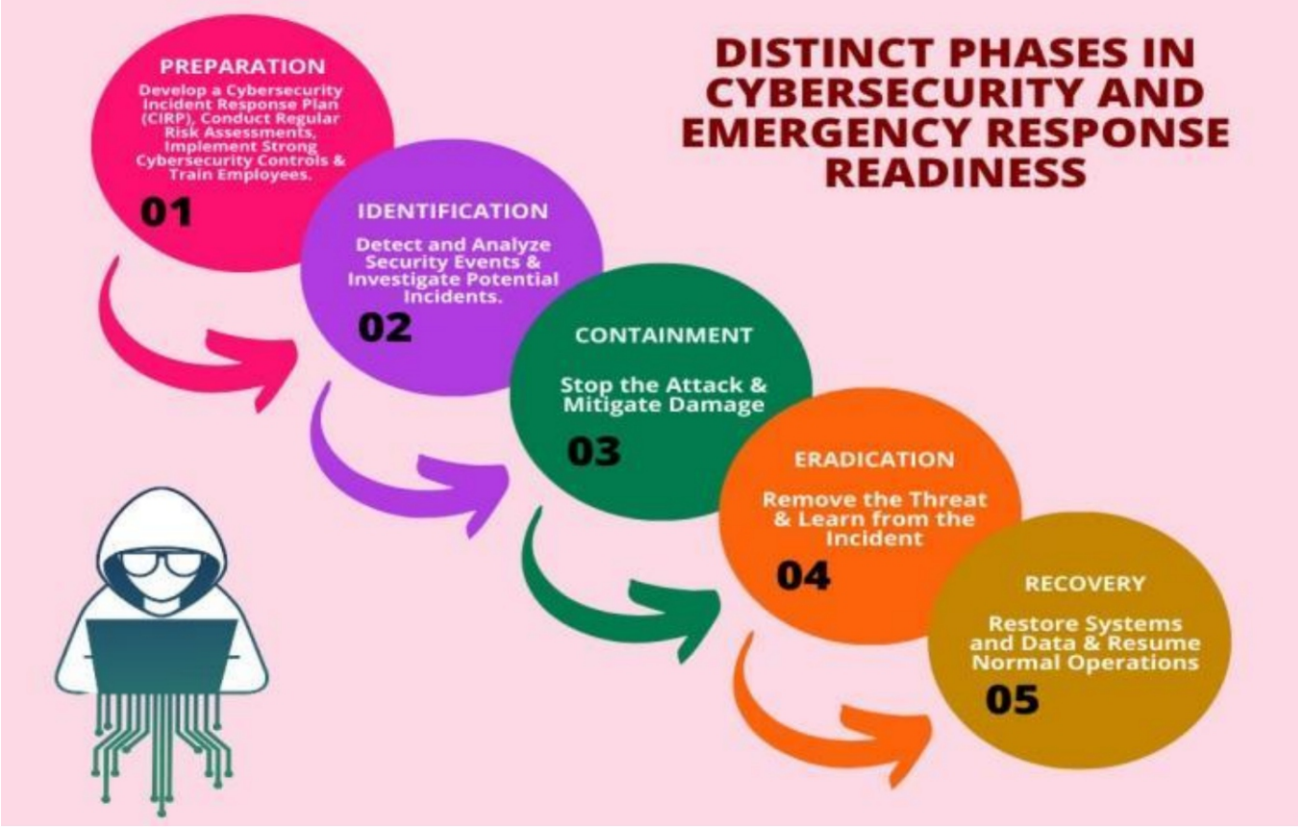

Fig 2: Distinct Phases in Cyber Security and Emergency Response Readiness

1. **Preparation**
   - **a.** Align organizational policies on data protection and network security with technology infrastructure
   - **b.** Ensure employees have cybersecurity awareness and incident response training
   - **c.** Document roles, responsibilities, and procedures
   - **d.** Conduct regular security assessments and audits

2. **Identification**
   - **a.** Detect and analyze security incidents or potential breaches
   - **b.** Determine the scope and impact of the incident
   - **c.** Activate the incident response plan and assemble the response team

3. **Containment**
   - **a.** Mitigate immediate damage and prevent further spread of the incident
   - **b.** Take systems offline if necessary, delete compromised data safely
   - **c.** Review backups, credentials, and security updates
4. **Eradication**
   - **a.** Eliminate the root cause of the incident
   - **b.** Remove malware, patch vulnerabilities, update software
   - **c.** Ensure all traces of malicious content are removed
5. **Recovery**
   - **a.** Restore systems and data from backups
   - **b.** Test and verify restored systems
   - **c.** Monitor systems to prevent reoccurrence
   - **d.** Document recovery activities
6. **Lessons Learned**
   - **a.** Conduct a post-incident review to identify areas for improvement
   - **b.** Update incident response plan based on lessons learned
   - **c.** Share threat intelligence and best practices with relevant stakeholders

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Common challenges faced by Incident response teams:

1. **Lack of Preparedness**
   - **a.** Many organizations do not have a well-documented incident response plan or have not properly tested their plan.
   - **b.** This can lead to delays in response times, confusion among responders, and an ineffective overall response.
2. **Lack of Resources**
   - **a.** Incident response requires a team of experienced professionals, as well as the right tools and technologies.
   - **b.** Organizations often lack the necessary personnel, training, and technology to respond effectively to incidents.

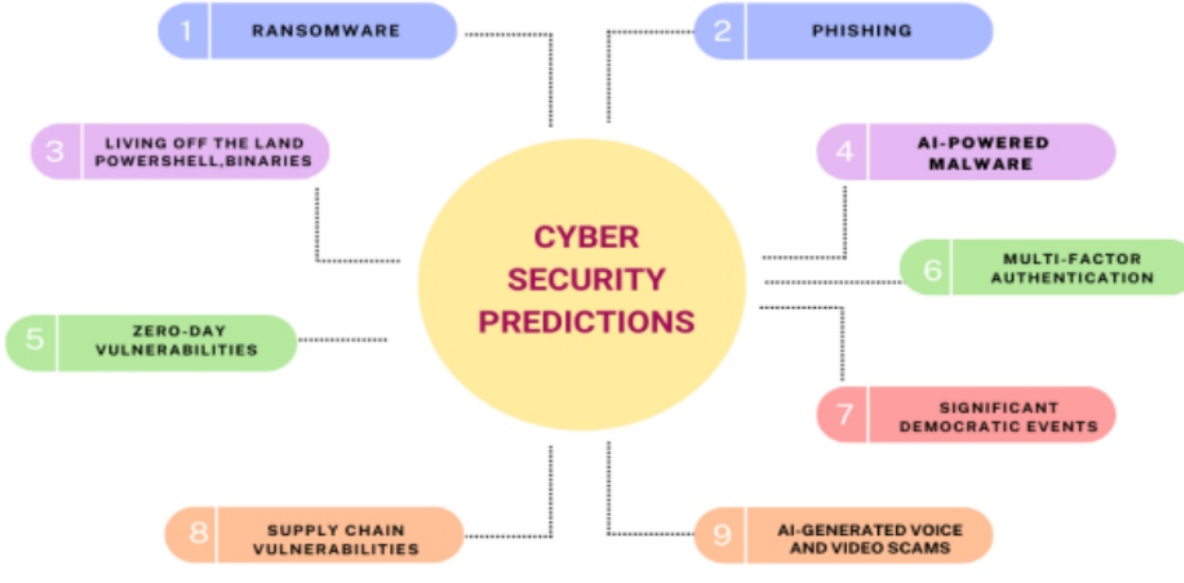
3. **Visibility Challenges**
   - **a.** Incident response requires visibility into an organization's systems, applications, and networks.
   - **b.** Many organizations lack the monitoring capabilities, logging, and threat intelligence needed to detect and respond to incidents.

4. **Complexity of Incidents**
   - **a.** Security incidents can be complex, involving multiple systems, applications, and networks.
   - **b.** This makes it difficult for incident response teams to quickly identify the root cause and respond effectively.

5. **Communication and Collaboration Issues**
   - **a.** Incident response requires effective communication and collaboration between different teams and stakeholders.
   - **b.** Lack of clear communication and collaboration processes can result in delays, incomplete information sharing, and an ineffective overall response.

To overcome these challenges, the search results suggest that organizations should develop comprehensive incident response plans, ensure they have the necessary resources, invest in monitoring and visibility tools, and establish clear communication and collaboration processes. Regularly testing and updating the incident response plan is also crucial for maintaining readiness.

Cyber Security predictions:



Ransomware continues to pose a significant threat to organizations, with the cost of attacks expected to rise. Key trends include increased targeting of critical infrastructure and the rise of Ransomware-as-a-Service (RaaS), which lowers entry barriers for Cybercriminals.

1. Phishing attacks are increasing, often using personal data from social media to gain trust. As generative AI improves, it will be used more in scams, including mimicking voices. The dating app scams are also expected to rise.
2. 'Living off the land' binaries like Powershell and Certutil pose considerable risks, being exploited to disable security measures and conduct malicious activities.
3. AI-powered malware like Black Mamba poses significant threats, using AI for evasion and creating unique payloads.
4. Zero-day vulnerabilities are increasingly being exploited by cybercriminals and state sponsored groups for persistent access to networks.
5. Multi-Factor Authentication (MFA) fatigue attacks are a rising cybersecurity concern, where hackers inundate victims with repeated second-factor authentication requests, coercing them into granting access.
6. Significant democratic events, such as elections, inevitably draw the attention of adversaries. particularly in the form of phishing emails and malvertising. Artificial intelligence (AI) tools are increasingly being leveraged to scale up such attacks, making them more sophisticated and difficult to detect.
7. Supply chain vulnerabilities are a growing concern in cybersecurity, leading to targeted attacks with widespread consequences. The rise in such attacks call for new regulations and global collaboration between governments and private industries.
8. Looking ahead, AI-generated voice and video scams are emerging as a significant threat. These scams use advanced deep learning techniques to imitate trusted individuals, thus deceiving targets into revealing sensitive information or taking undesired actions.

Conclusion:

Cybersecurity and emergency response readiness are complementary disciplines that work together to protect an organization's assets, maintain business continuity, ensure compliance, and enhance overall cyber resilience. By addressing key areas like Incident Response Planning, Data Protection and Backup, Business Continuity, Regulatory Compliance, Cyber Resilience etc organizations can improve their ability to manage and mitigate the impact of security incidents.

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CHAPTER 18

Mining Tenement System (Mts) Indian Bureau of Mines

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Abstract:

Indian Bureau of Mines, an attached office of Ministry of Mines is committed to conservation of minerals, scientific development of mineral deposits and protection of environment in respect of major minerals (other than coal & atomic minerals) with the powers conferred under the Mines & Mineral (Development & Regulation) Act, 1957. The previous manual process for granting certificates, approvals, and ratings from IBM to stakeholders was time-consuming, causing delays in approvals and impacting the project life cycle of stakeholders. Acknowledging this challenge, there was a necessity for digitalization to enhance Government to Government (G2G), Government to Citizen (G2C), and Government to Business (G2B) services. This shift has notably shortened stakeholder timelines, standardized documentation, promoted quicker information exchange among Central/State Government entities, and accelerated decision-making processes. In this process, various applications termed as modules have been developed by Indian Bureau of Mines through the National Informatics Centre with few more are to follow the planned rollout. To name a few includes the registration, returns, mining plan approval, star rating, final mine closure plan, drone data management and mine imagery & data processing analysis system. As an outcome to the above, stakeholders have saved significant time, and decision-making processes have been expedited.

Keywords: Ministry of Mines, Indian Bureau of Mines, MTS Cell, Modules, NIC

Introduction:

Indian Bureau of Mines, an attached office of Ministry of Mines is committed to conservation of minerals, scientific development of mineral deposits and protection of environment in respect of major minerals (other than coal & atomic minerals) with the powers conferred under the Mines &

Mineral (Development & Regulation) Act, 1957. To administer its activities across the entire country, IBM has thirteen (13) Regional offices, four (4) Zonal offices, three (3) Laboratory with its centralized headquarter at Nagpur.

In recent years, IBM has embraced significant digital transformation to enhance transparency, efficiency, and accessibility. This shift to digital governance is progressively replacing manual processes, saving stakeholders' time in submitting applications and managing their mining tenements. Furthermore, it streamlines decision-making within IBM and enhances transparency in the system.

Some of the leading initiative adopted in this process of digital governance by IBM includes the submission & approval of mining plans & drone data management systems which are one of its unique applications in the world for approval of mining plans submitted under the provisions of Mineral Conservation & Development (MCDR) Rules, 2017 and drone/satellite-based imageries under rule 34A of MCDR, 2017, respectively.

Objective:

The earlier manual process involved towards grant of various certificates/ approvals/ ratings from IBM to the stakeholders were a time-consuming process resulting in delay in grant of approvals thereby affecting the project life cycle of stakeholders.

Recognizing this challenge, there was a consensus on the necessity for digitalization to facilitate Government to Government (G2G), Government to Citizen (G2C), and Government to Business (G2B) services. This transition has significantly reduced stakeholders' time, standardized documentation, facilitated faster information exchange between Central/State Government entities, and expedited decision-making processes.

Innovation & Impact:

The manual processes in place were thoroughly examined, and their requirements were standardized. These standardized procedures were then digitized through a System Requirement Specification, incorporating a process flow to handle data consumption, analysis, and exchange, ultimately producing the required information and reports.

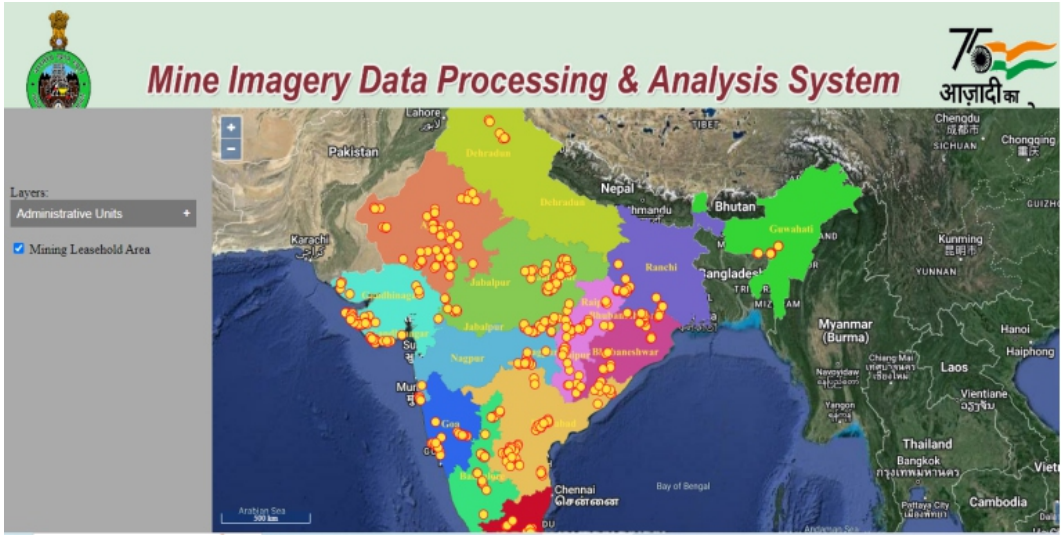


Figure 1: An output from the Mine Imagery Data Processing & Analysis System

Figure 2: An output from the Mine Imagery Data Processing & Analysis System

Consequently, in compliance with the stipulations of rule 45 of MCDR 2017, the registration and returns management systems were upgraded. Both portals were made accessible to the public on May 1, 2022. To date, approximately 24,000 applications have been received through the registration portal, and 87,000 returns have been submitted via the returns management portal.

Likewise, in accordance with the requirements outlined in rule 16/17 of Mineral Concession Rules (MCR), 2016, the mining plan approval system was developed, marking a pioneering initiative. This portal was made available to the public on July 12, 2022. Currently, 1200 applications (approximately) for approval have been received through this portal.

As per the directives set forth in rule 34A of MCDR 2017, stakeholders are mandated to submit drone/satellite-based imagery to IBM. Accordingly, the drone data management system was devised to process and manage this data online. The portal was launched on June 1, 2023, and has since received approximate 2500 imagery submissions.

Additionally, in accordance with the provisions outlined in MCDR 2017, MCR 2016, and Mineral Auction Rules, 2015, IBM is required to publish the average sale price of minerals on a monthly basis. To streamline this process, the system was automated, and a dedicated module (Average Sale Price system) was implemented, which was officially launched on January 23, 2024. Notably, the average sale price from December 2023 onwards could be published by the last date of the next month itself.

As per the requirement of rule 35 of MCDR 2017, the star rating templates for large & small mines are now accepted in the star rating portal which was developed & dedicated to the stakeholders on 31.3.24. For the financial year 2023-24, a total no. of 1200 mines (approximately) have submitted their self-assessed templates online.

As per rule 24 of MCDR 2017, the stake holders are also required to submit their Final Mine Closure Plan for proper scientific closure of their mines. The application for capturing the same was developed & deployed online on 10.6.24. From the database, it is seen that 11 Nos. of applications are being filled by the stakeholders.The dashboard in respect of all the above mentioned portals are shown below –

Figure 3: Dashboard of Registration Module

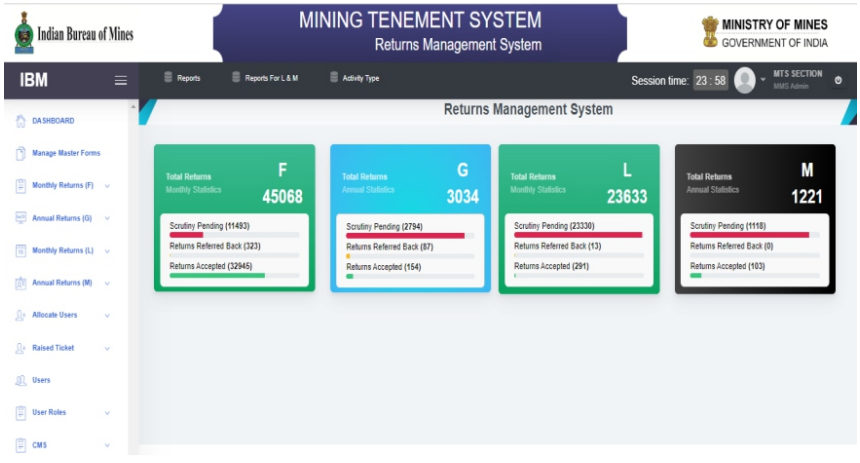


Figure 4: Dashboard of Returns Module

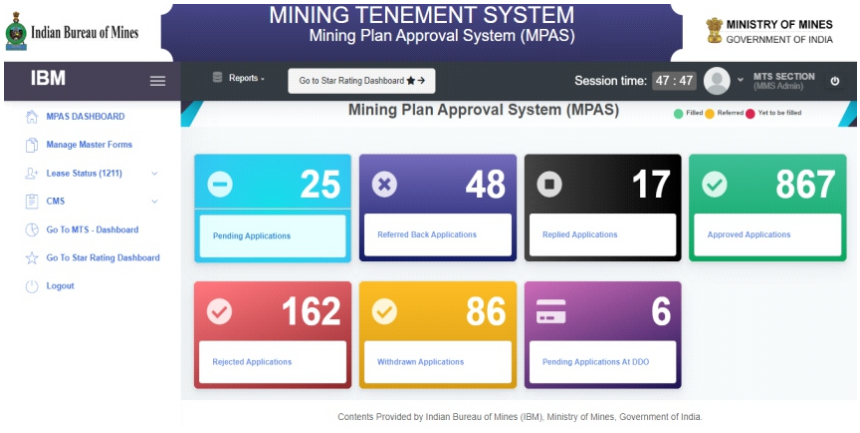


Figure 5: Dashboard of Returns Module

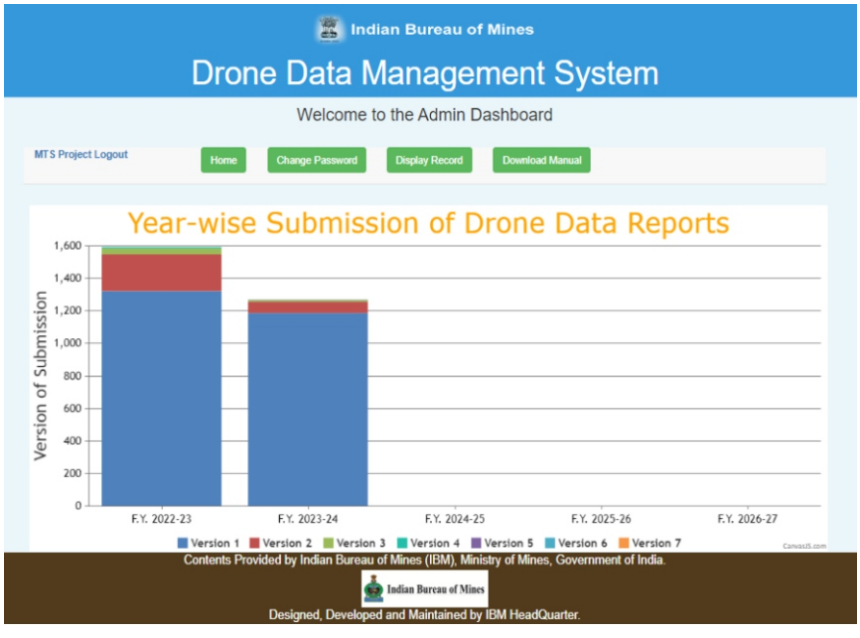
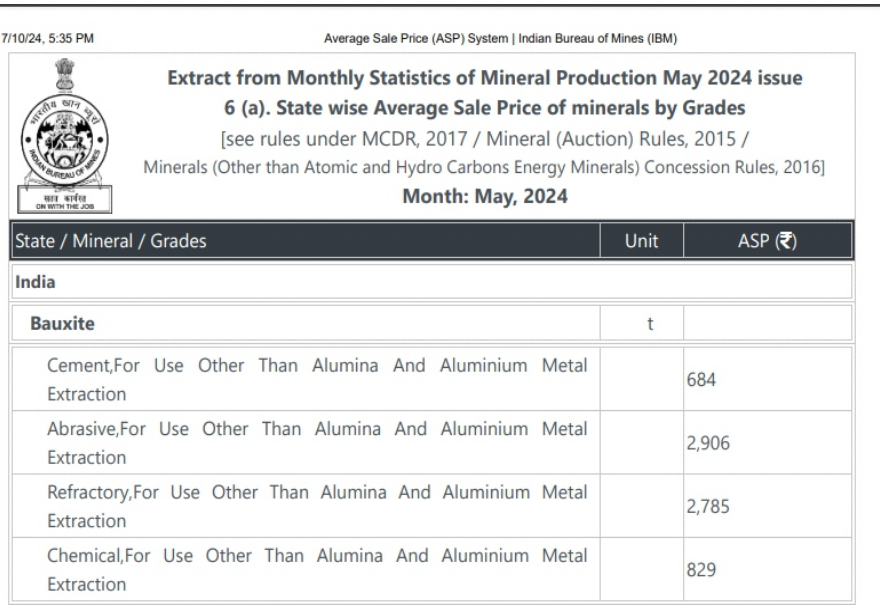


Figure 6: Dashboard of Drone data Management system



7/10/24, 5:35 PM Average Sale Price (ASP) System | Indian Bureau of Mines (IBM)

Extract from Monthly Statistics of Mineral Production May 2024 issue
6 (a). State wise Average Sale Price of minerals by Grades
[see rules under MCDR, 2017 / Mineral (Auction) Rules, 2015 /
Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016]
Month: May, 2024

State / Mineral / Grades	Unit	ASP (₹)
India		
Bauxite	t	
Cement,For Use Other Than Alumina And Aluminium Metal Extraction		684
Abrasive,For Use Other Than Alumina And Aluminium Metal Extraction		2,906
Refractory,For Use Other Than Alumina And Aluminium Metal Extraction		2,785
Chemical,For Use Other Than Alumina And Aluminium Metal Extraction		829

Figure 7: Output of Average Sale Price System

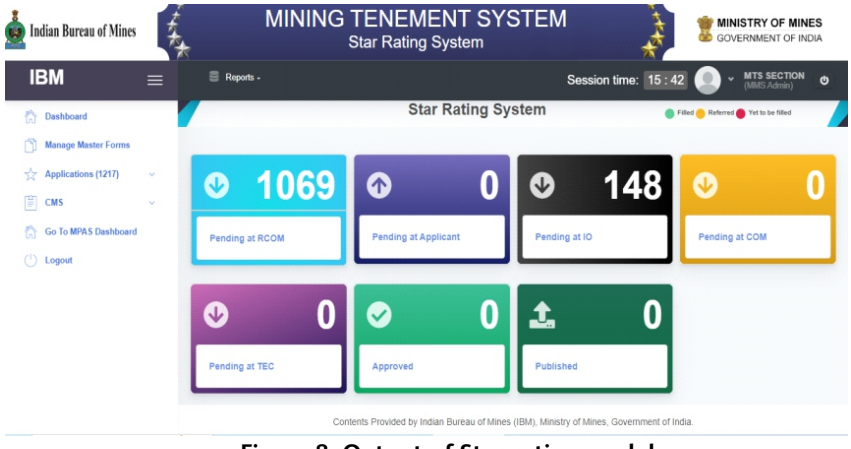


Figure 8: Output of Star rating module

Figure 9: Output of Final Mine Closure Plan Module

Implementation:

Following the standardization of inputs and outputs by IBM, a System Requirement Specification was developed by the National Informatics Centre (NIC) in collaboration with domain experts from the Indian Bureau of Mines (IBM). This process involved establishing a comprehensive process flow between external stakeholders such as miners, traders, exporters, end-users, and internal stakeholders including IBM and State Government entities.

The program underwent rigorous preparation and testing phases at both the NIC and user end (IBM) before being made available to the public. Subsequently, the application underwent thorough security audits and was then hosted on NIC cloud services, which provide both Data Centre (DC) and Disaster Recovery (DR) facilities.

To ensure seamless adoption of the system, extensive training programs were conducted to familiarize users with the modules. These training sessions were conducted through physical and virtual workshops, supplemented by a dedicated helpdesk accessible via email, SMS, and WhatsApp for ongoing support.

Results & Outcomes:

The outcome statistics are as follows-

Approximately 24,000 applications have been received in the registration portal and approximately 87,000 returns have been submitted in the return's management portal from approximately 2000 Nos. / 800 Nos. of external users since their release on May 1, 2022.

Approximately 1,200 applications for approval have been received in the mining plan approval system portal from approximately 800 users since its release on July 12, 2022.

Approximately 2,500 images, either drone or satellite-based, have been received in the drone data management system from approximately 1300 users since its release on June 1, 2023.

Notably, the average sale price from December 2023 onwards are published before the last date of the next month itself.

Approximately, 1,200 star rating submissions from large & small mines have also been consumed in the star rating portal.

These outcomes can be verified directly from their respective portals.

Sustainability & Scalability:

To address Change Management issues effectively, periodic user requirements are collected and reviewed in accordance with the importance of the concerns raised. These concerns are then addressed through a Change Management Approval Form, which IBM submits to NIC. Upon approval, the changes are implemented by the developers, and updated versions of the modules are released accordingly.

Partnership & Collaboration:

The Mining Tenement System project team at IBM formulates all the requirements, which are then developed by the NIC offices in Nagpur and Delhi.

Future Plans:

Continuing the momentum, a total of nine applications have already been developed & the remaining modules viz. Notices/Reports, Inspection, Revision & Mineral Processing - will follow suit as part of the planned rollout.

Testimonials:

The above modules are hosted with the following URL(s) and a screenshot of the respective dashboard are attached above at the innovation & impact head.

Registration system – https://ibmreg.nic.in/Login.aspx

Returns management System – https://ibmreturns.gov.in/

Mining plan approval system – https://miningplan.ibm.gov.in/MINING_PLAN/

Drone data management system - https://dronedms.ibm.gov.in/ddms/dashboard/index.php

Star rating system- https://miningplan.ibm.gov.in/STAR_RATING/

Final mine closure plan https://asp.ibm.gov.in/FMCP/Login.aspx

Figure 10: Certificate of Recognition for Govt. service delivery

Conclusion:

The digitalization process aimed at enhancing Government to Government (G2G), Government to Citizen (G2C), and Government to Business (G2B) services was accomplished within an unprecedented timeframe. These modules have undergone rigorous testing and have been proven effective with a record number of submissions. This has resulted in significant time savings for stakeholders and expedited the decision- making processes. The results can also be acknowledged with the Ministry of Mines, IBM being accorded the certificate of recognition for the exemplary contribution towards the Government e-service delivery.

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Government of India