

International Conference on
New Technologies and Innovations in Rural Roads
24-26th May, 2022



Pradhan Mantri
Gram Sadak Yojana

**Performance Assessment of Rural roads in Maintenance:
Development and Implementation of an objective evidence based
IT solution in PMGSY**

Presented By:
Pradeep Agrawal, IDSE
Director-Projects I, NRIDA

Co-authors:

Prashank Kumar, Assistant Engineer, Rural Works Department, Bihar
Tejas Nagrale, Young Civil Engineers, NRIDA





Pradhan Mantri
Gram Sadak Yojana

Rural Road Connectivity

7,78,625 km of roads
sanctioned

6,81,984 km roads
constructed

3,40,370 Cr Asset value worth

12% of India's entire road
network

1,78,000+ habitations connected

40.5 Cr population
(48% rural population) benefitted

PMGSY Roads: Lifeline of rural India



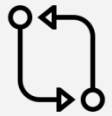
Promotes access
to economic and
Social Services



Increased
Agricultural
Income

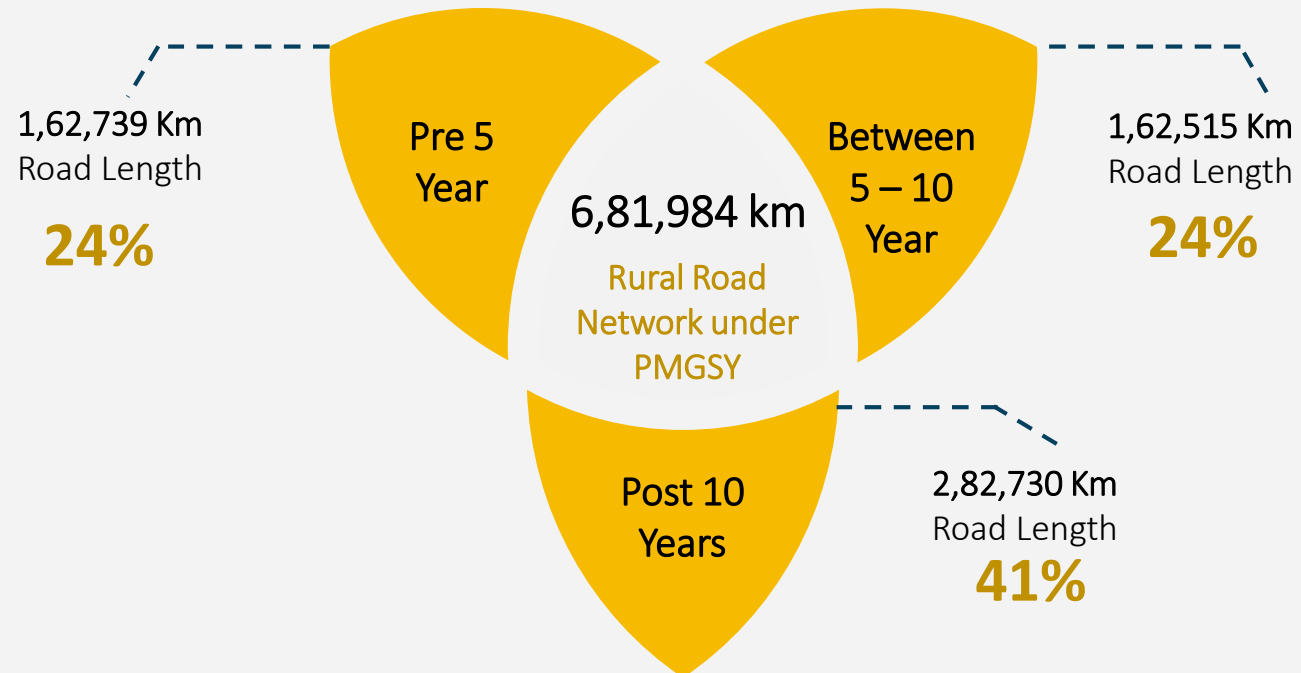


Productive Employment
Opportunities for Rural
population



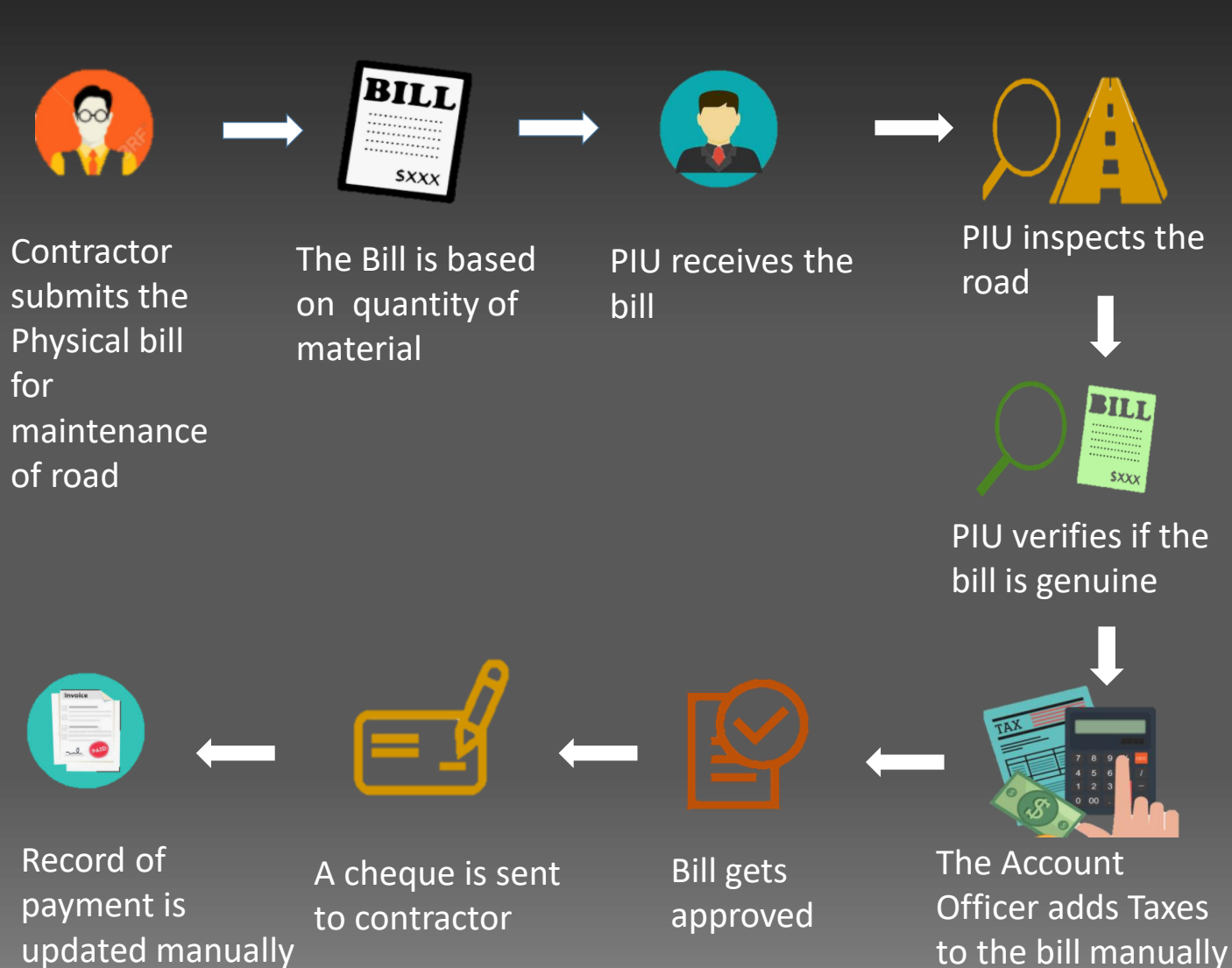
Sustainable
Poverty Reduction

Asset Created in PMGSY Scheme



**Salient Feature of PMGSY- Five year Guarantee period with construction
Routine maintenance of roads is key to preserving assets for design life**

BILL OF QUANTITIES (BOQ) TRADITIONAL METHOD OF MAINTENANCE



The cycle of payment started from Contractor submitting the bill



Payments to contractors based on quantity of work executed and not on quality of road



Routine Maintenance of roads missing from workflow



Labour Intensive manual processes (Bill generation, taxes, approvals, payments)



Paper based system and tedious record keeping

Performance Assessment Concept in Maintenance of Assets:

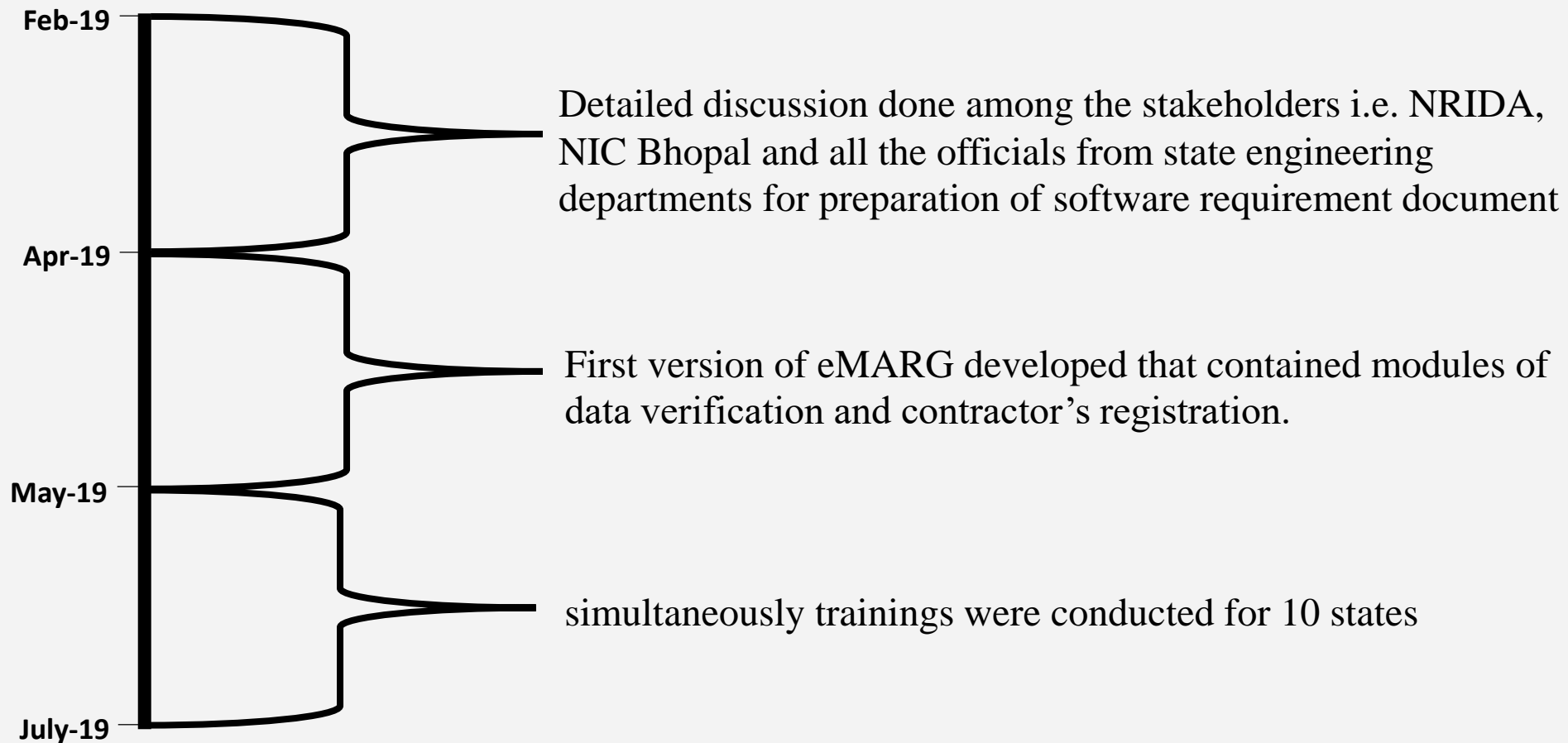
- *This innovative concept of performance assessment ensures that payment is made to contractor on outcome rather than on output basis*
- *Payment is unrelated to how much effort contractor has put in to bring road to good condition but on the measure if the road finally is in good condition or not*

Challenges in implementation:

- Bid Document is to be aligned to the concept of performance assessment
 - Objective criteria of focus on outcome to be achieved
 - Creating an evidence based system
 - Fully automation of payment cycles
-
- **These Challenges have been overcome for Rural Roads by aligning to all the requirements and taking the help of IT based solutions called eMARG**

Innovation in Conceptual Planning, Development, Training, State specific requirements & Implementation

- eMARG was developed and implemented on a very unique and modular approach of simultaneous development and implementation, differing from the traditional way of developing the complete product first and then implementing it
- The parallel process of Development and Implementation was carried out in 3 phases



FIRST PHASE OF DEVELOPMENT AND IMPLEMENTATION

Innovation in Conceptual Planning, Development, Training, State specific requirements & Implementation

Exchange of Data
Between OMMAS
and eMARG

← July-19

- Development of Second Version of eMARG related to payments to be made through eMARG
- Efforts were being made from NRIDA to convince states to convert traditional Bill of Quantity (BOQ)/hybrid system to PBMC system of payment

Sep-19

First Payment Done
through eMARG

← 1 Oct 19

Large scale trainings conducted for all the states for making payments through eMARG

Mar-20

Integration of the PMIS of PMGSY called OMMAS and eMARG

May-20

SECOND PHASE OF DEVELOPMENT AND IMPLEMENTATION

Innovation in Conceptual Planning, Development, Training, State specific requirements & Implementation

Payment of 100 cr
made through
eMARG

Sep-20

Nov-20

June-21

Oct-21

Modules were developed to tackle the exceptional cases in eMARG and simultaneous trainings were conducted for all states to explain these changes

Development of Modules in eMARG for compliance of conducting RI and PE as per SOP

THIRD PHASE OF DEVELOPMENT AND IMPLEMENTATION

Features of eMARG

Electronic Maintenance of Rural Roads

IT re-engineering for all functions related to the execution, monitoring and management of rural road maintenance centered around outcomes and evidence




End to end digitization of all processes related to maintenance from billing, verification of work, final payment to contractors and monitoring.

Fusion of multiple e-governance technologies such as Web ERP, GIS, mobile apps, SMS, digital payments and accounting.





Creation of Login credentials for all the stake holders



Comparison of Process of Payment Before and After eMARG

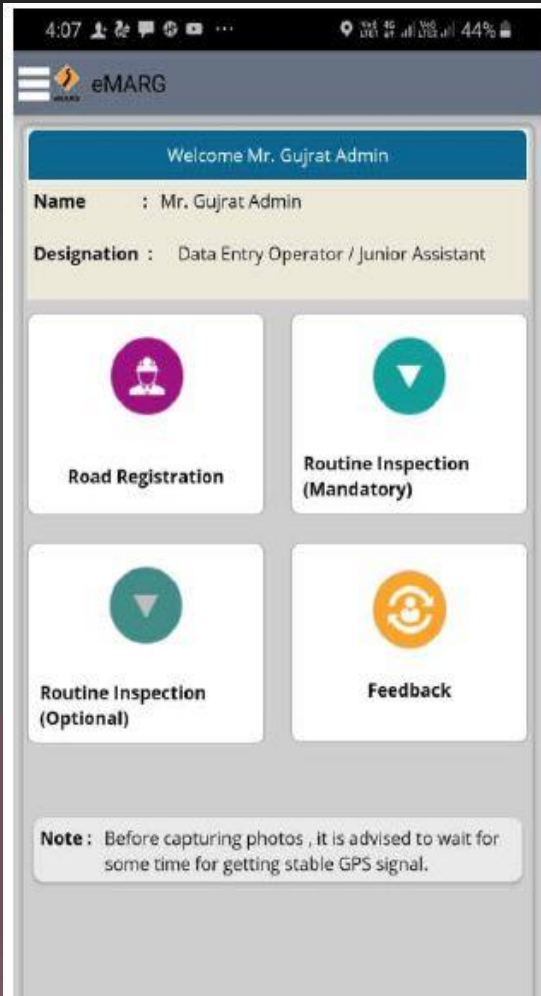
Process	Before	After
Bill Submission 	<ul style="list-style-type: none"> • Bills submitted manually based on labour/ material involved in maintenance • No control / record of date or frequency of Bill submission 	<ul style="list-style-type: none"> • eBill submitted in one click online with fixed maximum monthly amount • Monthly alerts for bill submission • No dispute around date of submission of bill
Routine Inspections 	<ul style="list-style-type: none"> • Inspection triggered by bill submission. A bad road without bill submitted will not be inspected • No permanent record or evidence of routine inspection 	<ul style="list-style-type: none"> • Bi-monthly Inspections done through eMARG mobile app with geo-tagged photos • Mobile notifications for reminders
Verification of Work & Bill 	<ul style="list-style-type: none"> • Primarily on the basis of volume /labour/material of work executed ie based on inputs • Done Manually by Engineers against the bill raised by contractor 	<ul style="list-style-type: none"> • Bill amount calculated by system based on marks awarded in Performance Evaluation ie outcomes • Photographs clicked in RI are used as base for this evaluation

Government Process Re-engineering (Pre-Post)

Voucher Generation 	<ul style="list-style-type: none">• Done Manually by Account Officer after deducting taxes manually from the approved Bill Amount	<ul style="list-style-type: none">• System generated with automatic tax deductions etc under Account Officer Login & DSC for digital signing of vouchers
Payments 	<ul style="list-style-type: none">• Done manually by Checque Payment and then entered into online accounting software	<ul style="list-style-type: none">• Directly into contractors account; single account per contractor.• Transaction sent to accounting software automatically by API
Cost Saving 	<ul style="list-style-type: none">• Payments made for periods where road was not maintained because of lack of routine evidence	<ul style="list-style-type: none">• Payment only based on months where minimum serviceability or performance is ensured
Data Analytics 	<ul style="list-style-type: none">• Only limited to total expenditure against roads	<ul style="list-style-type: none">• Process level monitoring: Reports, reviews, photographs and GIS

USE OF APP AND MOBILE TECHNOLOGY

eMARG MOBILE APP FOR CONDUCTING ROUTINE INSPECTIONS



Location for conducting inspections for every km auto generated by app



Two geo-tagged photographs per kilometer clicked



Each stretch is graded as Satisfactory/Unsatisfactory



App operates in offline mode and provision to upload photographs later when one comes in network area



District/State/Centre can conduct additional inspections on random road visits

SMS NOTIFICATIONS



SMS Notifications to contractors for submitting the bills every month



SMS Notifications to district engineers to conduct Routine Inspections every two months



SMS Notification to contractors in case the road gets Unsatisfactory grading in inspection




Every payment related transaction authenticated with OTP

ROUTINE INSPECTIONS – ROAD PICTURES AVAILABLE ON GIS FOR MONITORING


Inspection Analysis

District Name: Chittoor Block Name: Rama Kuppam

emang.gov.in/user/query/AndReport/MapViewRIPE.htm



Routine Inspection Profile

Road Name	(HR1.21)HR1.21-Vijilapuram to Kamataka boarder via Kilakpodu(6.531km)
Chainage Inspected(in Km.)	4.400 - 4.400
Insp. No	RI-AP-5260-5
Insp.Type	Mandatory
Grade	Satisfactory
Insp. Date	25/02/2020
Inspection Image	 Zoom Image

25-02-2020 17:55:50



Dashboard

Tasksheet - PIU Incharge

Services for PIU Incharge

Signing

Inspection

Query and Report

Help

My Setting

+ Tasksheet of Engineering Staff

PIU Incharge Tasksheet

User Name : Pradip Kumar Bal														Dated : 01-10-2021 06:00 AM	
District	PIU Name	Scroll Signing	Generation of Scroll	Voucher Approval	Forwarding to AO	Processing of Bills	PE Approval	Locking	Freezing	Splitting Approval	DLP Completion	Manual Expenditure Approval	Processing of Terminated/Foreclosed Packages	Balance Work Verification	
Dhenkanal	DPIU Of Dhenkanal (210)	0	0	0	184	26	0	0	0	0	0	0	0	0	
Dhenkanal	DPIU Of Dhenkanal - II (32)	0	0	0	20	12	0	0	0	0	0	0	0	0	

The facility of list of tasks to be done by Engineers on eMARG with call to action button



PROGRESS MADE SO FAR

Milestone of 1000 Cr Payment through eMARG Achieved

30

States and UTs
making payments

1,330

Engineers from 737
districts PAN India
using eMARG

12,261

Contractors
registered on
eMARG

2,40,612 km

Road available in
eMARG for
payments

42,000+ km

Routine Inspections
carried out monthly

5,00,000+

Photographs on
record for seeing the
condition of roads

10,00,000+

Bills Submitted by
contractors across
country

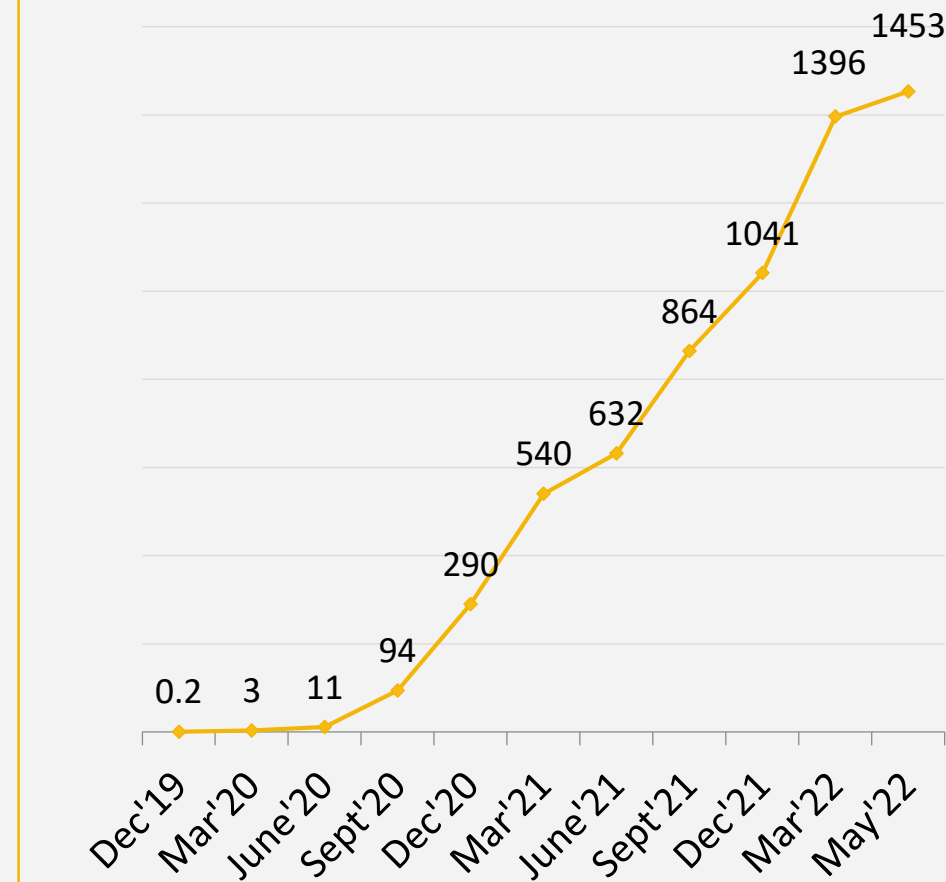
1,453 Cr

Payments disbursed
Nationally





11,259

Zero Payment Roads

Payments made through eMARG



Awards and Recognition so far

-  **Gems of Digital India Award 2020 (Analyst's Choice)**
-  **Gold Award Winners for Skoch Awards 2020**
-  **Silver Award Winners for National Awards for eGovernance 2021**
-  **Award of Appreciation, 19th CSI SIG eGovernance Awards 2021**

Thank You