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TQM & Business Excellence

Digital and Sustainable transformation of Logistics in Chrome Ore Mines using Artificial Intelligence



SUKINDA CHROMITE MINES

LAYOUT OF LOGISTIC OPERATION





16 LAKH TONNE CHROME ORE HANDLED IN FY-23 THROUGH 400+ TRUCKS PER DAY





SUPPLY CHAIN NETWORK

3 Chrome Ore Mines

8 Ferrochrome Plants

- Own (Athagarh, Bamnipal, Gopalpur, Jaipur)
- 4 Processing Partners

Customers

KEY STAKEHOLDERS

DDM / DDCA – Government of Odisha Transport Association – 6 Transport Partners – 10 Loading Partner – 1 Number of drivers in the valley – 4500 Number of trucks in the valley – 4000

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- Truck entry into the mines is governed by Honourable High Court order on the basis of First-Come-First-Load
- Socio-Political issues
- Trucks provided by local transport associations to our appointed Transport Partners
- Managing 400+ trucks and drivers manually every day, non-dedicated floating trucks and drivers
- Multiple IT system like i3MS (a system of Government of Odisha) for Transit Pass, Genesis for Loading Slip, SAP for Invoice, NIC Portal for e-Invoice and e-Waybill
- The entire process of truck entry to exit from mines start in early morning from 5 am onwards and continues upto 9 pm
- Longer stay of drivers inside the mines and inadequate infrastructure of basic amenities leading to unwanted stress





PROBLEM – HIGH TURNAROUND TIME OF TRUCKS AND UNSAFE OPERATION WITHIN MINES



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OBSERVATIONAL ANALYSIS AND TIME STUDY - DISPATCH PROCESS FLOW



DMADIC 15 mins 20 mins 60 mins **Entry Gate Tare Weight** Loading Driver gets out of truck to hand over the Loading takes about 1 hour Manual truck sequencing to adhere document to weigh bridge operator for tare FIFO & entry at parking weight capture Manual checking of documents for Manual update of tare weight in i3MS and SAP cross-verification in M-Parivahan and Manual stack selection Vahan Pre-loading receipt generated on desktop Manual issue of entry slip / gate pass Manual entry of details by operator in log-book 45 mins 40 mins 60 mins **Gross Weight Verification Bridge Exit Gate** Operator hands over printed Manual entry of gross weight in SAP & i3MS Weighment of loaded trucks documents Manual printing of TP Checks for weight limit violations Exit truck details recorded Gross weight and trip details validated in SAP Manual adjustment of manually in log-book Manual creation / printing of delivery challan weighment Transporter supervisor Manual generation / printing of e-way bill manually generates LR Document consolidation and hand over

Red Text depicts inefficient / unsafe practice

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ROOT CAUSE ANALYSIS OF INEFFICIENCIES



DMADIC



	SI. No.	Factors	Purpose	Design Element
	1	Context based customized IT solution	Digitalization	Competent Digital partner selection to leverage on Artificial Intelligence
	2	Infrastructure augmentation	Digitalization	IT connectivity inside mines
	3	Integration of Multiple IT Systems	Digitalization	Unified platform for SAP, i3MS, GST Portal
	4	Safe Traffic Management / Validation of truck and drivers	Safety	Automated boom-barrier, traffic control system
	5	Monitoring of trucks	Operational Efficiency	RFID tags / GPS for each truck
	6	Detailed Information of trucks and drivers	Digitalization	Digital profile for trucks, drivers and transport partners
	7	Safe Working Condition	Safety / Well-being	Amenity centre / training centre for drivers
(R) (R)		Manual documentation and extensive use of paper and cartridge	Sustainability	Document Cell

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INTEGRATED LOGISTICS DIGITAL PLATFORM





DMADIC

Every transaction made is on a particular trip is stored on a ledger, and is verified against other transactions on the trip. This constitutes eLog's quasi blockchain architecture.

Transaction validity rules are customizable and can be configured the according business to requirements. eLog allows only valid transactions at that point of time to performed be by respective stakeholders, significantly decreasing the number of user errors and data corruption caused due to errors.



Al powered Quasi Blockchain based Digital Solution



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IMPLEMENTATION TIME PLAN

DMADIC

SI No	Nilostono Chart						Per	riod						
51. NO.	Milestone Chart	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23
1	Vendor finilisation and Sign off with vendor													
2	Placement order for hardware devices													
3	Start Application Design and Development													
4	Complete ERP Integration, build APIs to Integrate with Hardware & Integration with Hardware devices													
5	Complete Unit Testing of end to end platform & Application Dry run test								2000					
6	Training to Transporters, Users and UAT with users													
7	Get sign-off on platform readiness												2222	
8	Go Live													
	PLAN			DE	LAYEI	D					ON		100	

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NEW DIGITIZED PROCESS – RFID POWERED AI BASED QUASI BLOCKCHAIN





KPI'S BEING MONITORED



DMADIC







New drivers need to be trained for familiarization with mine's hazard



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KPI'S BEING MONITORED



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Truck and Driver blacklist due to safety violation in mine from Jan'23 to May'24











CONTROL AND MONITORING OF TRUCKS / DRIVERS

ΓΛΤΛ

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CLEAR VISIBILITY & REAL-TIME MONITORING THROUGH MOBILE APP





Manage Sales Orders





Instant Trip / Driver Details



Telematics



Monitoring TAT



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TRUCK VALIDATION AND TRAFFIC MANAGEMENT



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i-Tag on Trucks

Traffic Lights

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BEFORE VS AFTER

Sr. No.	Subject	Before	After	Result
1	Manual Intervention (excluding loading area)	9 instances per truck	2 instances per truck	Improvement in Safety - Reduction in Man- Machine interface
2	Usage of Paper (A4 sheet per truck)	8	3	Saving of almost 50,000 papers a month -> reduction in Carbon Footprint
3	Turn-Around - Time inside mines	4-5 Hours	2 Hours	Faster completion of daily job
4	Mental Stress	High waiting time	Less waiting time	Improved Work-Life balance
5	Process and Systems	Complex, no visibility	Simple & complete visualisation	Digitization



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AUTO DOCUMENT GENERATION/PRINTING



TATA STEEL MINING

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STEP TOWARDS WELLBEING OF UNSUNG HEROES (DRIVERS) OF OUR LOGISTIC ECO-SYSTEM









Amenity Centre for Drivers

Training Centre for Drivers

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BLOOD PRESSURE

Tarpaulin covering facility for loaded trucks



Rest Shelter for Drivers

<image>

Drivers



Canteen facility for Drivers



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WAY FORWARD // JOURNEY CONTINUES.....





IMPROVED MENTAL WELLBEING

CARBON

FUTURE

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