

T R A N S P O R T A T I O N

A SUCCESSFUL GEOSPATIAL SOLUTION CASE STUDY

SUMMARY

IOCL transports large quantities of petroleum products between its supply depots and retail outlets. To better manage the transportation process and costs, it has undertaken to digitize the process of identifying the shortest transport routes on all-weather motorable roads for delivering its products. This activity is now undertaken successfully using geospatial technology which enables the Company to identify alternate routes between start and end points and automatically calculate the distance between them. The solution also provides digital tools for managers to verify and approve the selected routes. Early assessment of the implemented solution indicates cost and time savings, better management and increased convenience to the Company.

INTRODUCTION

Indian Oil Corporation Limited (IOCL), a 'Fortune 500' Corporation, is India's largest commercial enterprise, with a net profit of ₹103.99 billion for the financial year 2015-16. It is engaged in the business of refining, transporting and marketing of crude oil and petroleum products. In its pursuit to provide best customer service of global standard, IOCL envisaged the application of Geographic Information Systems (GIS) technology to digitize and upgrade several internal work processes.

In the years 2015 and 2016, IOCL published tenders calling for IT/GIS services relating to route mapping and road distance determination; and developing a server based map solution for verification and approval of these routes by IOCL officials. These tenders were floated separately for different states and regions. ML Infomap was contracted to undertake this project in several states. As of now, some states have completed design, development, testing and deployment of the solutions. In other states, work is in progress. IOCL also requires the maintenance of the implemented solution for a period of five years.

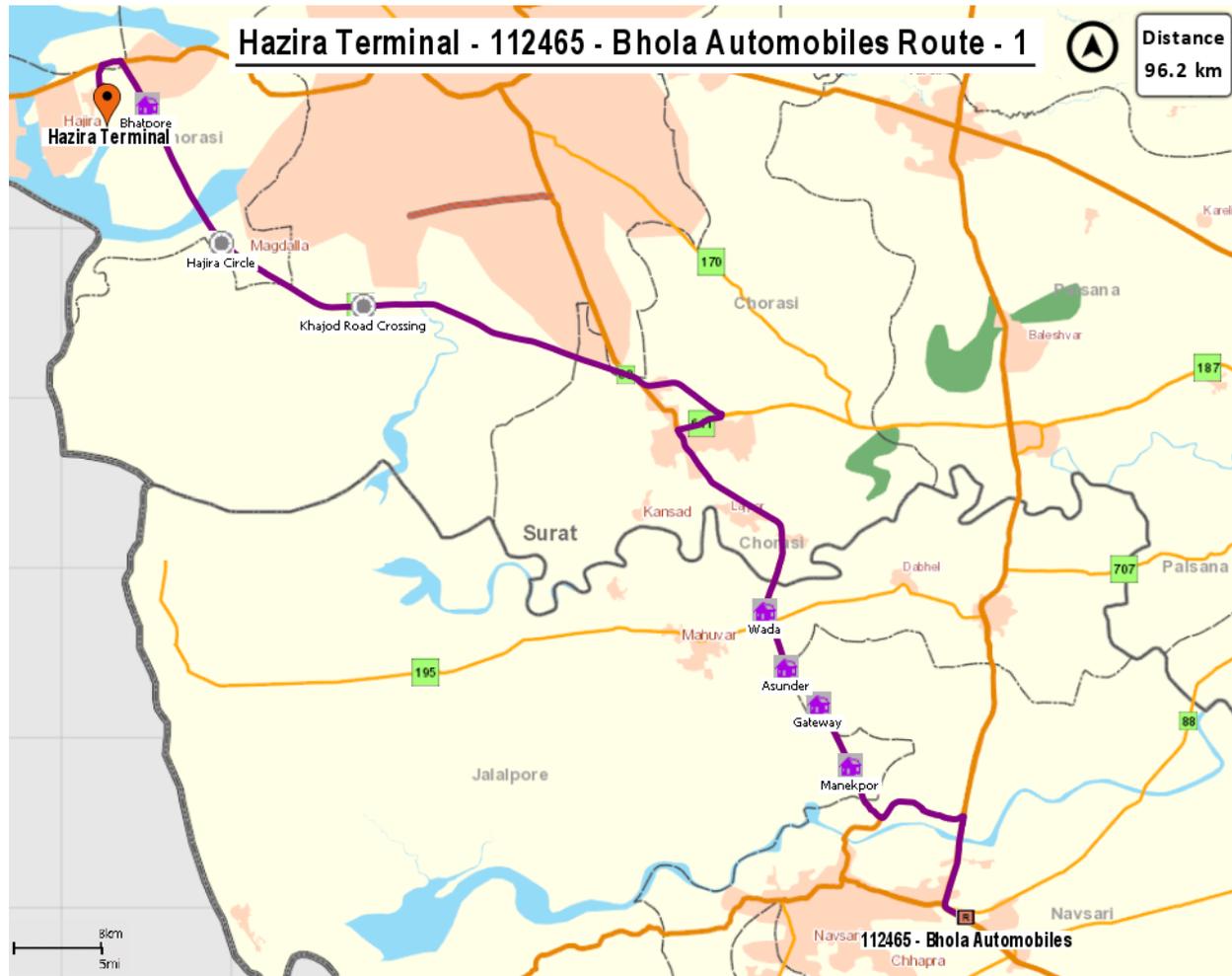
Transportation is an important cost component in any industry where physical products are distributed over large geographies. This is more so in retail distribution where the product requires to be replenished often. This is an aspect that has drawn much attention among managers who have used geospatial digital solutions to reduce cost of delivery. However, our experience in undertaking the above project has shown that using a well designed IT/GIS solution has many more advantages.

USABILITY

IOCL required identifying the shortest route on all-weather motorable roads for transporting oil and petroleum products from their supply depots to retail outlets and other end points. Further, it planned locating company assets relating to its distribution network entities on digital maps. This would lead to optimizing IOCL resources across large areas and also identify the most suitable routes between loading depots and supply destinations. The activities could only be possible within a geospatial environment and be provided on a GIS platform.

This project was planned for use by several different departments of IOCL in all states of the country, which would benefit IOCL in multiple ways. Distribution of products is a critical part of IOCL's business and the solution would streamline the logistics of transportation and lead to smooth supply to petrol stations and other outlets. Managerial staff required to maintain better control over all business processes which would happen through controlled access to the Web based system. Internal administrative processes required approving each route at several levels of administrative hierarchy and making routine reports. The accounting departments required information to make payments to transport contractors, without disputes arising on the bills. And several other less obvious reasons

included discouraging deviation from approved routes by transporters and complete transparency in the approval process.



The core of the solution was to create multiple routes on all-weather motorable roads between supply and delivery points. For each route their total distance from start to end was recorded. All these routes were created on accurate high resolution digital maps on a GIS server platform. These routes were then made available to each manager responsible for giving approval through controlled access on the IOCL intranet network. Automatic mails were triggered to concerned persons if there was a delay in the approval.

The shortest approved route was used by IOCL for paying out to transport contractors, on the basis of price calculations made through the solution. If there was disruption on the route for any reason, the next approved route was used by the transporter to deliver the products.

IndianOil Geodatabase creation for Round Trip Road Distance verification in Gujarat State

Home | Route Upload | User Management | Email Management | Log Management | ROCO Management | Reverification Status | Days Buffer Management | View Routes

View OP46 | Reports

Reports

- View Approved Route Levels Reports
- View Uploaded Routes Report

View Approved Route Levels Reports | View Uploaded Routes Report

View Routes Reports

Routes Uploaded:	2145	View
Routes Approved:	6	View
Routes Rejected:	1	View

Total No. of Records : 6 [Download](#) [Email](#)

SNo	Terminal Code	Terminal Name	ROCO Code	ROCO Name	Status
1	3235	Manmad Terminal	262870	Sai Nandini Petroleum	Approved
2	3235	Manmad Terminal	263305	Gangai Petroleum	Approved
3	3243	Sewree II Terminal	143823	Ordnance Factory - Varangaon	Approved
4	3246	Chandrapur Depot	129937	Maharashtra Electros melt Ltd	Approved
5	3257	Khapri Depot	149124	Mail Motor Service (Spo)	Approved
6	3257	Khapri Depot	209767	Dy Engineer Sadar - Nagpur	Approved

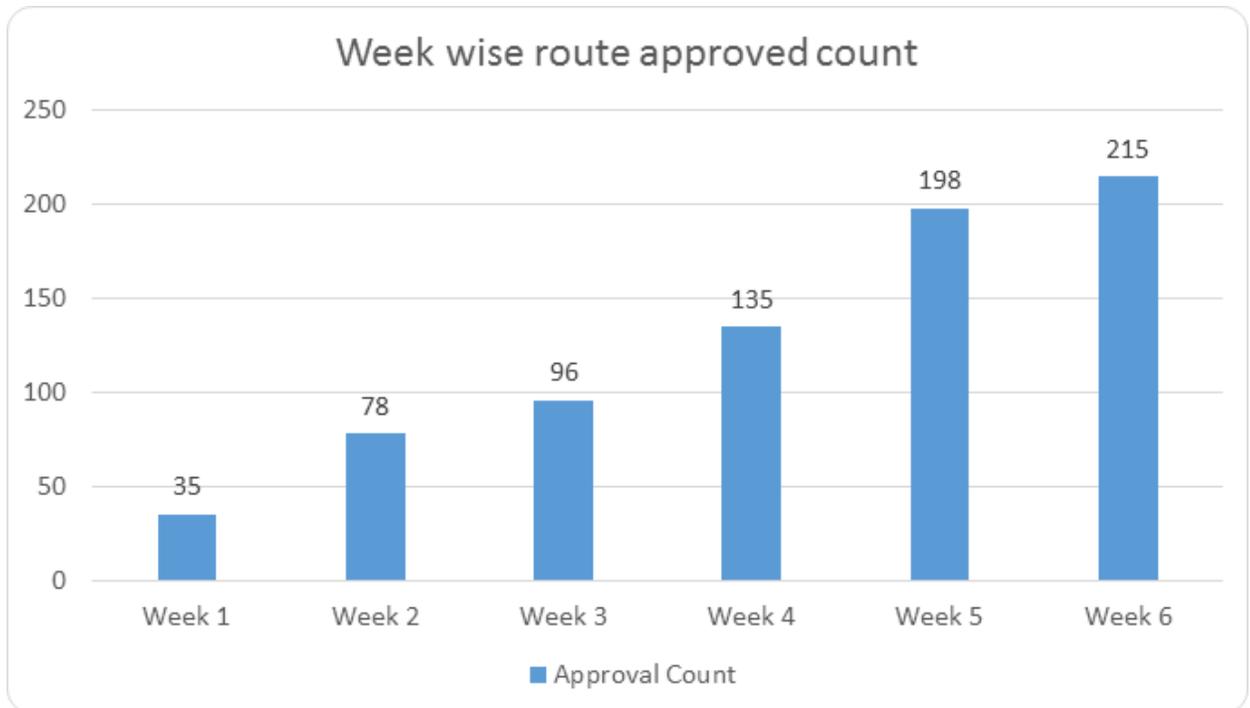
As retail and commercial outlets are included or excluded in the transportation network, or motorable roads are constructed in the area, these changes will be introduced into the system. It follows that new routes can be approved for these areas.

Weekly and monthly analytics of transportation related data is created into reports and available to managers. These reports are made by geography and aimed at multiple hierarchical levels of managers.

BENEFITS AND IMPACT

The IT/GIS solution developed and implemented for IOC has already demonstrated the benefits that were expected of it, and more. Some of these positives are as follows:

1. **Return on Investment** The distances of the routes between terminals/supply depots and retail outlets recorded in the past, often vary from those suggested by the newly implemented solution using geospatial tools. This is usually because the distance measurements were earlier made from small scale paper maps or reported by drivers on the route. As the digital routes were identified and calculated from high resolution maps, the results compared favorably with ground distance. Using the current method, in one state, IOCL has on an average reduced road distance by 2.6 km. per route. This has resulted in a saving of approximately Rs 12.5 lakhs per month or Rs. 1.5 crores per year in this state alone. So, the saving on distributing petroleum products, as a consequence of implementing this project across the country, would conservatively be Rs 35 crore per year. This has clearly established the cost saving to the company as well as the fact that such projects are cost effective, when compared to the cost of undertaking them. IOCL will recover cost of the project within one year and financially benefit for a much longer time.
2. **Time Saving** As explained above, a route selected by the software is approved by several officials before it is incorporated into the system and finally used for pricing and payment for transport cost. The approval process can be completed within a very short time now, while it was a month long process earlier. As retail outlets cannot be supplied except along approved routes, this has greatly reduced the possibility of their not receiving supply because of delay in approval. The developed approval process, now fully digital, has dramatically reduced the time taken to approve a new or altered route.



3. Alternative Transport Routes At times of emergencies, for example, during concentrated heavy rainfall that renders sections of roads unmotorable, or unexpected closure of roads, or temporary diversions along approved routes, the alternative routes proposed in the system can be used without delay. As these routes are already available within the system as approved routes, there is no disruption of supplies.
4. Virtual Environment Sitting at one's work desk, employees of IOCL can now view digital maps, approved transport routes, all assets and related information in graphs and tables. On the digital map, operators can see the complete route at single glance, which was not possible on paper sheets. Officials no longer need to access paper documents or unwieldy map sheets that also require safe storage. Results of analytics and routine daily, weekly and monthly reports are generated speedily and sent to the designated recipients. Thus virtualization of maps, documents and activities has proved immensely convenient.
5. Better Management On the whole, as a result of employing a well integrated Web based GIS solution, the management of the logistics of transportation of petroleum products has improved a great deal in the states where the IT/GIS solution is now being used. Today, the system proposes shortest available motorable route which was not necessarily the optimal ones chosen manually earlier. As stated above, this has translated into substantial cost savings.
 There is no longer need for physical availability of any person for approval of routes and documents. All stages of approval can be tracked and reminders sent to those whose approval is pending. This frees persons to perform other duties without wasting time on work undertaken physically, in person, earlier. The change in work culture too is taking place. Moving from a manual and slow process, it is changing to a digital, transparent and efficient system. Management is able to look into the system and know the exact status of activities at all times.

The ultimate impact of the systems to IOCL will be evident once all the states of the country have implemented the IT/GIS solution.