

## **Water Transport between Mumbai-Diu (via Daman): A Feasibility study**

### **Author details:**

Author-1:

Name: Naveen Kumar \*

Affiliation: Chief Manager (Technical-Ship Building)

Postal address: 1C/32, Kalpataru Aura, LBS Road, Ghatkopar West, Mumbai-400086

E-mail: [kumarguptanaveen@yahoo.com](mailto:kumarguptanaveen@yahoo.com)

Author-2:

Name: Dr. Shivendra Kumar Pandey

Affiliation: Indian Institute of Management Rohtak

Postal address: Indian Institute of Management Rohtak, Management city, Nr. Sunaria PTC, Rohtak, Haryana – 124001.

E-mail: [sk.pandey@iimrohtak.ac.in](mailto:sk.pandey@iimrohtak.ac.in)

Author-3:

Name: Prof. Dheeraj Sharma

Affiliation: Indian Institute of Management Rohtak / Indian Institute of Management Ahmedabad

Postal address: Indian Institute of Management Rohtak, Management city, Nr. Sunaria PTC, Rohtak, Haryana – 124001.

E-mail: [dsharma@iima.ac.in](mailto:dsharma@iima.ac.in)

**\* Corresponding author**

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**Abstract:**

This case examines the opportunity of starting a sea route using a ferry between Mumbai to Diu (via Daman). At present, there is no ferry between Mumbai to Diu. People can travel between Mumbai to Daman using road, train or air mode. However, from Daman to Diu, the travel time by train, bus or car is as much as 14-15 hours. There is no ferry service between Daman and Diu even though the nautical distance between Diu-Daman is only 120 nautical miles (196 Km) in comparison to the road distance of approximately 700 km. The case examines the feasibility of starting a passenger ferry service between Mumbai-Diu (via Daman) which can cut down the travel time between Mumbai- Diu to less than half of the current time.

**Keywords:**

Water Transportation, Feasibility, Operation, Tourism, Ferry, Diu

On December 22, 2017, Mr. Rakesh Damania, CEO of Gujarat Inland Water Shipping Company read in TOI (<https://timesofindia.indiatimes.com/city/surat/daman-diu-ferry-service-may-finally-see-light-of-the-day/articleshow/62199498.cms>) that the Daman and Diu administration saw a considerable demand for a ferry service between Daman and Diu. Rakesh smelled an opportunity. He thought of starting the service from Mumbai to Diu via Daman to take the first mover advantage. However, he was not sure whether the ferry would be economically viable. He knew that if he did not act fast and the route was profitable, competitors may enter and he may lose on an excellent opportunity. On the other hand, if the route was economically non-viable and he launched the service, it may lead to a considerable loss of money and reputation. As other shipping companies might also be thinking on similar lines, he decided to conduct a feasibility study and present it in the next Board meeting on December 29, 2017.

### **The Gujarat Inland Water Shipping Company (GIWSC):**

Mr. Ramesh Damania, the father of Mr. Rakesh Damania, started the Gujarat Inland Water Shipping company around 20 years back. Initially, he started a few cargo transportation services along the coastal towns and interior parts of Gujarat within the navigable riverways. The company was still a small player in the Indian maritime industry and money was a scarce resource. However, GIWSC was known for having an eye for new routes and was considered aggressive by competitors on this count.

### **The route Mumbai-Daman-Diu:**

Daman & Diu, the second smallest union territory is situated on the west coast of India. These twin islands were under the control of the Portuguese for 450 years. The massive forts, magnificent cathedrals, and other impressive monuments of Daman & Diu exude the subtle old-world charm of its colonial era. The Fort of Moti Daman, Diu Fort, and 16th-century churches reflect the territory's past as a Portuguese Colony. Daman & Diu are

renowned for natural beauty. The beaches are neat and clean and offer opportunities for water sports. Owing to its favorable climate, scenic location, and serene surroundings, Daman & Diu has immense tourism potential (Refer to Figure 1 and Figure 2). However, the tourism potential at Diu cannot be realized as long, and tedious road/rail journey to Diu from South Gujarat or Daman keeps most visitors away from traveling to Diu. For instance, it takes almost 15 hours from Surat by Road to travel to Diu. However, the ferry service from Daman could reduce the travel time to Diu to only six hours (<https://timesofindia.indiatimes.com/city/surat/daman-diu-ferry-service-may-finally-see-light-of-the-day/articleshow/62199498.cms>). The nautical distance between Diu-Daman is 120 nautical miles (196 Km) in comparison to the road distance of 700 km (<https://daman.nic.in/about-daman.aspx>). A narrow channel separates them through the sea route.

### **Present Transportation Options for Commuting from Mumbai to Daman and Diu:**

Daman and Diu union territory is situated on the west coast of India along the Arabian Sea. This small Union territory is located near Maharashtra and Gujarat. Though Daman and Diu are connected with Gujarat and Maharashtra through road/rail transportation network, there is no direct connectivity through water-ways. The present options to reach them are as follows:

#### **By Air:**

Daman Airport is three km away from the city. However, Daman Airport is mostly used as a military airport. Hence, Mumbai Airport is the nearest domestic/international airport to Daman, and it is located at a distance of 193 km. Diu has a domestic airport. Air India operates flights between Mumbai and Diu. Another way to reach Diu is to reach Bhavnagar or Porbandar by air and then take the road to the destination. The airfare from Mumbai to Diu (via Air India) or Daman-Diu (via Helicopter) is approximately Rs. 4000.

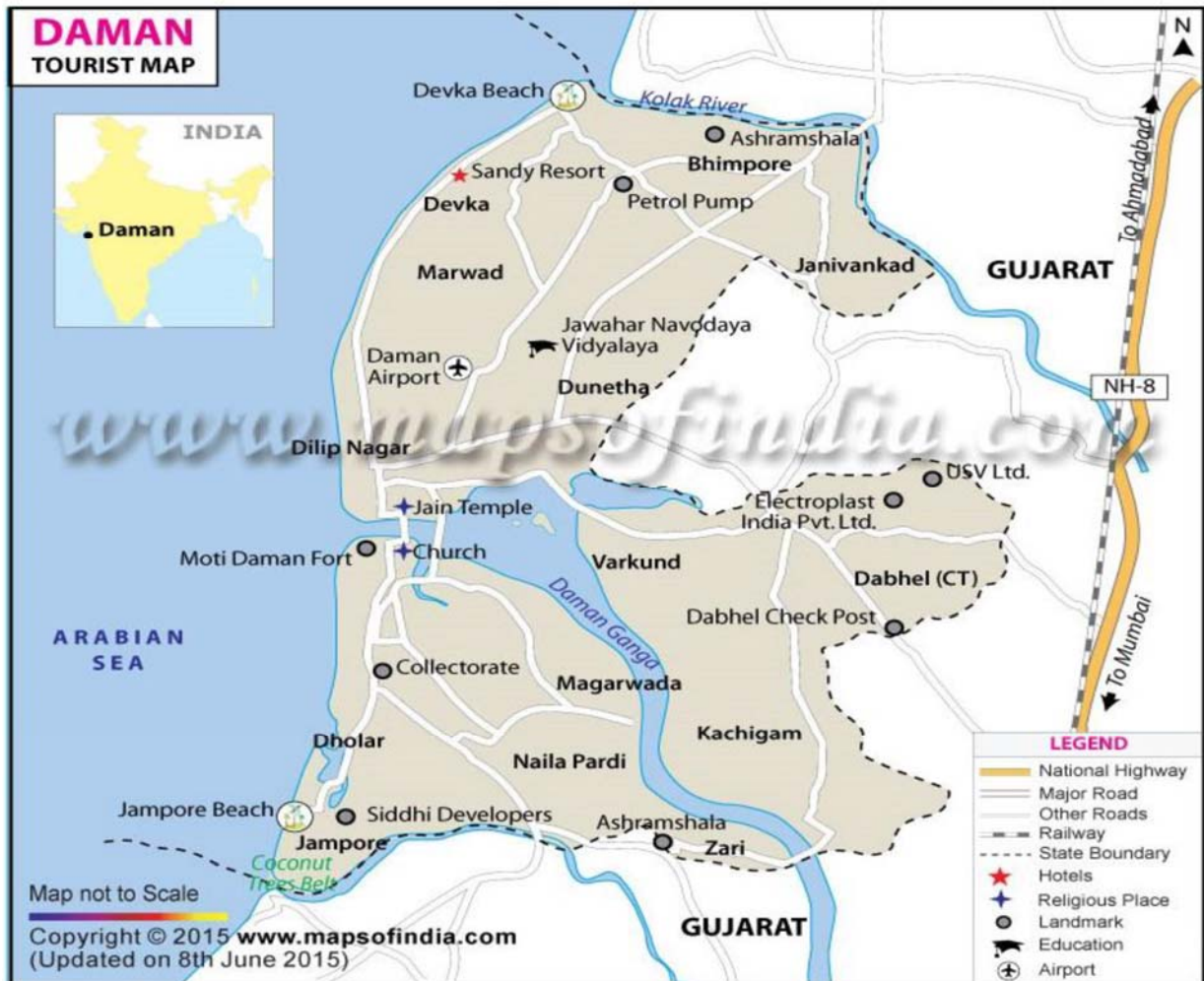
**By Train:**

Vapi station is the nearest railway station to Daman (12 km away). Another nearby station is Valsad Junction, about 35 km from Daman. Nearest railway station to Diu is Delwada. Veraval railway station is also closely connected to Diu (about 90 km away). It provides onward connection to Ahmedabad, Mumbai and other cities. The fare from Mumbai to Delwada is approximately Rs. 1000 for AC Three Tier and Rs. 250 for Sleeper.

**By Road:**

Daman and Diu are connected to the other parts of India through the road network. The National Highway number 8 is used to connect Daman by the motorable road with Mumbai. Further, there is a motorable road between Daman and Diu. There is/are nearly two direct buses (es) plying between Daman and Diu. The bus services are Bhavani Travels (Daman) and Bharat Travels. While travel time from Mumbai to Daman by bus is approx. 3 hours with an average fare of about Rs. 250/-, the minimum time a bus takes to reach Diu from Daman is 14h 45m with an average fare of about Rs. 500/- For a traveler from Mumbai reaching Diu via Daman by bus costs about Rs. 750/-.

Figure 1: Tourist Map of Daman



**Nearby cities:-**

MUMBAI - 193 KM

AHMEDABAD - 367 KM

DIU - 763 KM

PANAJI (GOA) VIA MUMBAI - 787 KM

Figure 2 The Tourist Map of Diu:



**Figure 3 Location of Daman and Diu in Gujarat state:**



**Results of Market Survey undertaken by the company:**

Mr. Damania and his team did a market survey to gauge people’s expectations and preferences for the mode of transportation for traveling from Mumbai- Diu and vice versa. The outcome of the market survey is summarized in **Exhibit 1**.

To evaluate the project’s viability, Mr. Damania looked at various costs that would be incurred in starting and running the ferry service. Based on the records, he could estimate the following costs:

**Acquisition cost:**

Acquisition cost of the vessel was expected to be about USD 6 Million (43 Crore rupees) in the first year. He estimated that GIWSC could buy an 8-10-year-old vessel at the above price from the second-hand/resale market. The particulars of the vessel would be as follows:

Data and names used in this report have been disguised and any resemblance is a mere coincidence

<b>Capacity</b>	<b>150 Pax + 6 Crew</b>
Hull material	Aluminum
Length Overall	Less than 30 m
Breadth	Less than 10 m
Draught	Not more than 1.5 meters
Engine	2 high speed diesel engines@1600 BHP
<b>Maximum Speed</b>	<b>33 Knots (53 Km/h)</b>
<b>Cruising Speed</b>	<b>30 Knots (48 Km/h)</b>

The useful life of a vessel is about 25 years. However, it is a standard practice to operate a vessel for up to 30 years with proper maintenance.

**Capital Cost:**

<b>Items Particulars</b>	<b>Amount (In Crore)</b>
Cost of new Catamaran (Ship)	43
Construction of new jetties (Nil as proposed to use existing facilities)	-
Land side infrastructure cost (ticketing booth, parking lot expansion, pedestrian improvement, the approach road to jetties, waiting shelter, furniture, vending machines, metal detectors, etc.)	20
Contingency cost	21
Interest cost / finance charges	09
<b>Total Capex</b>	<b>93</b>

The cost for development of landside infrastructure includes the building of passenger waiting lounge to accommodate about 200 passengers with the sitting arrangement, proper ventilation (e.g., AC) & illumination systems, toilet blocks, drinking water, and pantry facilities for waiting/arriving passengers. This cost also includes the cost of installation of security systems like metal detectors for passenger checking, X-ray systems for checking baggage and belongings of passengers. The infrastructure development cost also includes the development of the vehicle parking area, ticketing counter, open area illumination, pedestrian improvement for embarkation and disembarkation from/to the craft to/from jetty, and shore power supply arrangement. However, as an operator/contractor Damania has to consider only the capital cost incurred in acquiring the vessel as the Government/Administration will incur other capital expenditure.

#### **Operating cost:**

Operating cost of the ship depends on the number of days the ship is in commercial operation in a year. Like other transportation modes, providing passenger ferry service requires annual expenditures for operation and maintenance, including paying the crew, performing general maintenance and upkeep of the vessels and facilities, and providing fuel. The operating costs of ferry service vary dramatically depending on an array of factors such as desired speed, fuel price, passenger amenities, marine conditions, and available docking facilities.

Annual Operating cost consists of:

- **Voyage Cost (Fuel and lube oil cost)**
- **Manpower Cost – Crew wages, fringe benefits, and employer taxes**
- **Repair and Maintenance**
- **Insurance Cost**
- **Vehicle Inspection and Survey Cost**

- **Port charges**
- **Marketing and Advertising expenses**

**Bunker/Fuel Cost:**

Fuel Cost Assumptions	Mumbai-Diu
Nautical Distance	160 nm
Travel time per trip	6 hours
Travel time per round trip	12 hours
Operational days in a year	204
Total operating hours per annum	2448
<b>Mileage i.e. Fuel Consumption (Litres/Hour)</b>	<b>410</b>
<b>Diesel rate per liter (Rs.)</b>	<b>70</b>

The trend of fuel cost over the last few years is given in **Exhibit 2**.

**Crew Cost:**

The size of the crew required is dependent on the number of passengers carried and the vessel's configuration. In order to run the passenger ferry service, the following workforce is required for the proposed vessel:

No. of Captain per vessel	1
No. of Co-Captain per vessel	1
No. of engineer per vessel	1
No. of Crew per vessel	3

**Insurance:**

Following types of marine insurance coverage typically would be carried to operate a passenger ferry service.

Hull & Machinery Insurance - Hull & Machinery (H&M) insurance covers accidental damage to the boat itself from risks such as collision, grounding, etc. H&M insurance is based on the replacement cost of the vessel. It is estimated at 2% of the depreciating project value.

Protection and Indemnity Insurance- It is assumed as 1% of the depreciating value. Insurance cost is therefore 3% of the depreciating value.

**Repair and Maintenance:**

This cost includes both regular maintenances such as changing the oil and filters, painting and the major maintenance such as dry-docking which requires taking the vessel out of service. Total annual vessel maintenance expense for a vessel is estimated to be equal to 3% of the purchase price of the vessel, for a vessel operating a nominal 2,000 hours annually.

**Inspection and Survey:**

Sea-going vessels have to go through a series of inspections in order to meet the minimum requirement to continue sailing. Periodic survey and inspection of the ship are carried out to ensure the safety and seaworthiness of vessels. It is estimated that the inspection cost per vessel per annum for 150 Pax ferry will be about Rs 8,00,000.

**Port charges:**

Port charges are levied by the port to all ships entering the port till the time it leaves the port. Port charges are calculated on the gross registered tonnage of the ship as per the tonnage certificate issued for that ship. Each port has its methodology of charging such port dues. It is generally charged by the port to maintain their infrastructure and entry channels and facilities used thereof like buoys, moorings.

The port charges at Daman and Diu port and Mumbai Port are estimated as Rs. 8 lakh per vessel per annum.

**Marketing and Advertising Expenses:**

Appropriate and innovative marketing strategies would be required to promote this service. Initially, around 1% of the total revenue may have to be spent on marketing and advertising the ferry service.

**Revenue estimation:**

Key revenue assumptions are as follows:

Each vessel capacity will be 150 passengers.

Revenue Assumptions	Mumbai-Diu Route
Number of vessels	1
Passenger capacity per day per trip	150
Nos. of passengers per round trip (to and fro)	300
Ferry fare per passenger	2000
Annual increase	10%
Income from other sources as % of the fare	3%

To assess the demand from passengers an initial survey has been conducted as the viability of the project depends on the occupancy of the ferry services. The outcome of the market survey is attached in **Exhibit 1**.

Passenger ferry utilization is estimated to be within 75-95% range wherein 75% is the pessimistic view, and 95% is the optimistic view.

Due to rough sea during the monsoon period, the ferry can operate only during fair weather. Considering rough sea for almost five months period, the total number of fair-weather days are considered about 204 days in a year.

Damania was optimistic that given the convenience factor passengers would be willing to pay an even higher fare.

**The Dilemma**

Rakesh was in a fix. He knew that the time is running out. He has to decide whether to start the ferry service or not? He also knew that he required to prepare a plan so that the Board members can be convinced that the venture will be profitable.

### Exhibit 1:

The below analysis summarizes the responses of the travel survey conducted between Daman-Diu-Daman.

#### Passenger's current mode of travel:

Rail 9%  
Road 65%  
Air 6%  
Any Suitable Mode 20%

The travel cost and time required by the passengers by using different modes of transport are mentioned below:

	Cost	Time Required
Rail	No direct Service	No direct service
Road	Rs 500-700	16 hours
Air (Helicopter service)	4000	2 hours

#### Journey Purpose:

Business 20%  
Meet Family/Friends 28%  
Other (Health related, education etc.) 6%  
Tourism  
/Leisure 46%

Almost 46% of the journey undertaken on this route is for 'Tourism/Leisure,' followed by 'Meeting Family/ Friends/Relatives' (28%) and then Business (20%)

#### Travel Frequency:

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Weekly	9%
Fortnightly	5%
Monthly	29%
Occasionally	57%

According to the present traveling pattern of the passengers in the sample, 57% of respondents travel on this route ‘Occasionally’ while 29% of the passengers travel ‘Monthly.’ The market survey undertaken has given us important feedback that these ‘Occasional Travellers’ are keen to travel more. These ‘Occasional Travellers’ can be effectively targeted to make them active travelers. The project strategy would lie in pulling this segment into our shoes by attracting these travelers by developing the sea mode of transportation.

#### **Choice of Sea-Mode Travel – Ferry Services**

Yes	98%
No	2%

Respondents expressed a highly welcoming interest in using the ferry services. As per the survey results, nearly all (98%) of the respondents strongly agreed to travel on this route via sea – ferry services.

#### **Reason to Prefer Sea Mode of Travel**

Time Saving	68%
Cost Saving	8%
Comfort	5%
Fun Filled Ferry Service	19%

In order to understand the respondent’s attitude, they were asked the reason to prefer sea mode of travel. The most important driving factor indicated by the majority of them was ‘Time-Saving’ while only 8% of the respondents attributed it to ‘Cost Saving.’ This inclination indicates that passengers would pay a premium for faster and reliable service.

### **Preferred Arrival/Departure Time Slot**

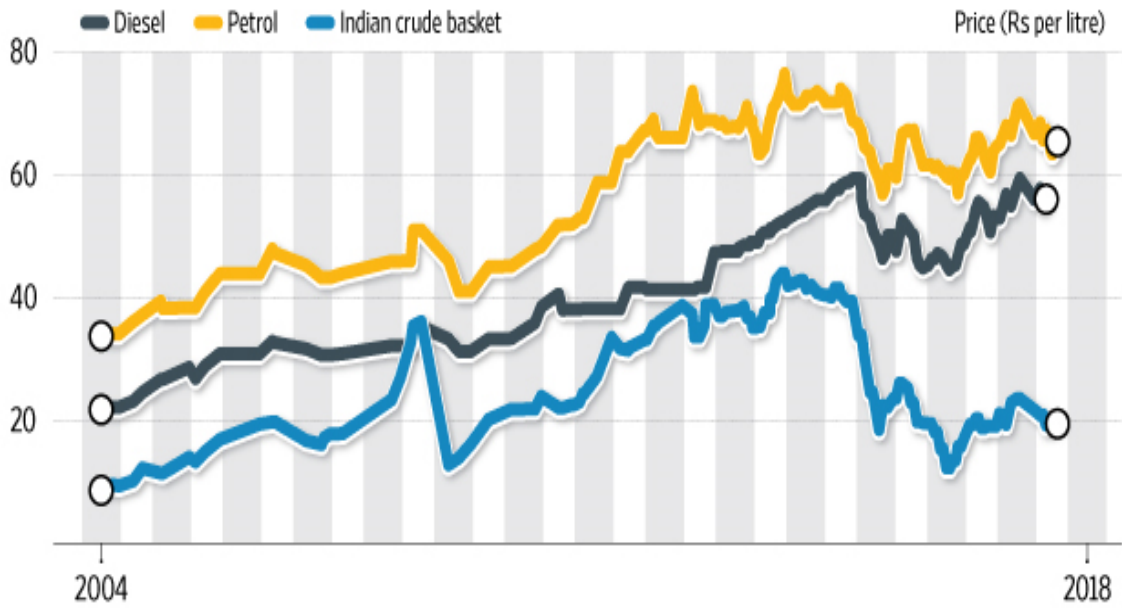
Morning Slot	67%
Afternoon Slot	10%
Evening Slot	23%

Respondents were asked about their preferred time slot to commence the inward journey to Diu. From the sample, almost 67% of the people indicated the morning slot, followed by 23% evening slot and afternoon slot (10%).

The survey revealed that 55% of the participants prefer evening slot for their outward journey from Diu, followed by 32% morning slot, afternoon slot (13%).

Exhibit 2:

### CHART 1: RETAIL PRICES OF PETROL AND DIESEL, ALONG WITH THE PRICE OF CRUDE OIL



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