

# TRANSPORTATION RISK ASSOCIATED WITH OVER DIMENSIONAL CARGO (ODC) IN TECHNIP ENERGIES INDIA, CHENNAI

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## ABSTRACT:

The study focuses on assessing the transportation risks associated with Over Dimensional Cargo (ODC) in Technip Energies India, Chennai. It aims to identify major risk factors, evaluate existing safety practices, and suggest effective mitigation strategies. Data was collected through a structured questionnaire and analyzed using descriptive statistics, correlation, Cronbach's Alpha, and a risk matrix. The results revealed that permit delays, vehicle breakdowns, and weather disruptions are key risks impacting project timelines. The study concludes that enhancing digital monitoring systems, improving coordination, and providing regular training can significantly reduce transportation-related risks in ODC movements within EPC projects.

## KEYWORDS:

Over Dimensional Cargo (ODC), Risk Management, Transportation Risk, EPC Projects, Technip Energies, Risk Assessment, Logistics, Safety Practices, Cronbach's Alpha, Risk Matrix.

## INTRODUCTION:

Over Dimensional Cargo (ODC) transportation is a critical activity in Engineering, Procurement, and Construction (EPC) projects, involving the movement of large and heavy equipment that exceeds standard size limits. Such operations carry significant risks due to factors like permit delays, poor infrastructure, weather disruptions, and equipment failure. Technip Energies India frequently handles ODC movements for major industrial projects, where effective risk management is essential to ensure safety and timely delivery. This study focuses on identifying key transportation risks, evaluating current management practices, and suggesting strategies to enhance safety and operational efficiency in ODC logistics.

## OBJECTIVES:

- To identify and classify the key risks associated with the transportation of Over Dimensional Cargo (ODC) in Technip Energies India projects.
- To evaluate the current risk management practices and safety protocols followed during ODC transportation and recommend effective mitigation strategies.

## REVIEW OF LITERATURE:

**Raghavan, S. et al. (2023):** Blockchain Solutions for ODC Permit Management Tamil Nadu.

Tests a blockchain-based permit approval system that reduced processing time from 17

**Chennai City Traffic Police (2022):** Impact of ODC Movements on Urban Traffic Flow: Empirical Study.

Measures traffic disruption patterns from 53 ODC movements across Chennai. Found average congestion duration of 4.2 hours per movement on arterial roads. Proposes optimized movement windows and alternative routing through the Northern Access Road to minimize city traffic impacts.

**Chennai Metropolitan Development Authority (2022):** ODC Route Planning Algorithm for Smart City Infrastructure. CMDA Technical Report.

Develops an AI-powered routing tool that integrates live data from 87 traffic cameras and 14 weigh-in-motion sensors across Chennai. Field tests showed 22% reduction in route conflicts and 18% fuel savings. Includes API specifications for integration with existing logistics management systems.

**Mehta, P. and Srinivasan, R. (2022):** Cost-Benefit Analysis of Dedicated ODC Corridors in Urban India. Transport Policy, Vol. 118, pp. 91-102.

This study evaluates the feasibility of establishing dedicated ODC routes in Chennai's industrial belt. Using traffic simulation models, the authors demonstrate that designated corridors could reduce transport time by 35% and accident rates by 40%. The research identifies the Ennore-Manali corridor as priority location for pilot implementation, with projected ROI of 6.2 years.

**Indian Institute of Logistics (2021):** Cold Chain Transport of Oversized Medical Equipment, Chennai Case Studies. IIL Research Paper No. 21-ODC-04.

Examining 15 specialized ODC medical equipment transports in Chennai, this study reveals temperature control failures in 60% of movements. Develops a protocol combining real-time thermal monitoring with backup power systems that improved reliability to 92%. Particularly relevant for vaccine manufacturing equipment transport to Oragadam industrial park.

**Jha, K.N. and Singh, S. (2021)** "Selection of Optimum Mode of Transportation for ODC/OWC Cargo: A Critical Review". Journal of Advanced Research in Dynamical and Control Systems, Vol. 13, Issue 6, pp. 1549-1559.

This critical review article provides an overview of the different modes of transportation for ODC/OWC cargos and critically examines the factors that affect the selection of the optimal mode of transportation. The authors consider factors such as cargo dimensions, weight, distance, cost, infrastructure, and environmental impact. The article concludes that the selection of the optimal mode of transportation for ODC/OWC cargos depends on various factors and requires a detailed analysis of all relevant factors.

**Lin et al. (2021):** Environmental impact of over-dimensional cargo transportation and identified several strategies for reducing emissions. Such as using alternative fuels, improving vehicle efficiency, and optimizing transportation routes. (Petru and Krivda 2021) The interest in the project cargo logistics promotes the research for the safe transport of oversized cargoes within the city's land transport infrastructure. Parietal. Discuss determining the parameters for safely passing oversized cargo on the road.

**RESEARCH METHODOLOGY:**

**Research Design & Approach:**

The study adopts a descriptive research design with a quantitative approach to assess the risks associated with the transportation of Over Dimensional Cargo (ODC) in Technip Energies India, Chennai. This design helps in identifying, classifying, and analyzing the likelihood and impact of transportation risks and evaluating existing safety practices using structured survey data.

**Sampling Technique:**

The study uses a purposive sampling technique, focusing on employees directly involved in ODC transportation activities such as those from Procurement, Civil, Mechanical, and Risk Management departments. This method ensures that data is collected from respondents with relevant experience and practical knowledge of ODC logistics and safety procedures.

**Statistical Tools Used:**

- Frequency Analysis
- Descriptive Statistics
- Cronbach’s Alpha Test
- Correlation Analysis
- Risk Matrix

**DATA ANALYSIS AND INTERPRETATION:**

**Risk Matrix Analysis:**

**Table showing Impact and Likelihood of risk**

Risk Factor	Likelihood (1–5)	Impact (1–5)	Risk Score (L × I)	Risk Level
Vehicle breakdowns	4	4	16	High

Permit delays	4	5	20	Critical
Accidents or near misses	5	5	25	Critical
Weather disruptions (rain, floods, cyclone)	3	4	12	High
Route constraints (narrow roads, bridges, sharp turns)	3	3	9	Medium
Community resistance or public protest	2	3	6	Medium
Poor communication among stakeholders	3	4	12	High
Lack of trained drivers or escorts	4	4	16	High
Emergency response delay	3	5	15	High
Inadequate insurance coverage	2	4	8	Medium

**Interpretation:**

The Risk Matrix analysis indicates that accidents, with a score of 25, and permit delays, with a score of 20, are classified as critical risks due to their high frequency and severe impact on project timelines and safety. Vehicle breakdowns, lack of trained drivers, and delays in emergency response fall under the high-risk category, emphasizing the importance of strong operational readiness and preparedness. Weather disruptions and poor communication also rank as high risks, underscoring the need for improved planning, coordination, and information flow among stakeholders. Meanwhile, community resistance, route constraints, and insurance-related issues are categorized as medium risks that require regular monitoring and timely corrective actions. Overall, the analysis highlights that proactive route surveys, comprehensive driver training, and effective preventive maintenance are essential to manage and mitigate both high and critical risks in ODC transportation operations.

### Correlation Analysis:

Correlations						
		What is your frequency of involvement in ODC projects?	Road/route challenges (bridges, turns, narrow roads) have high impact.	Have you faced regulatory permit rejection in ODC projects?	Overall, how satisfied are you with the current risk management practices in ODC transportation at Technip Energies?	Do you think additional digital tool (like GPS, drones, or AI monitoring) should be implemented to improve ODC transportation safety?
What is your frequency of involvement in ODC projects?	Pearson Correlation	1	-.238**	-.002	-.339**	-.136
	Sig. (2-tailed)		.008	.981	<.001	.133
	N	123	123	123	123	123
Road/route challenges (bridges, turns, narrow roads) have high impact.	Pearson Correlation	-.238**	1	-.255**	.002	-.249**
	Sig. (2-tailed)	.008		.004	.978	.006
	N	123	123	123	123	123
Have you faced regulatory permit rejection in ODC projects?	Pearson Correlation	-.002	-.255**	1	-.052	.288**
	Sig. (2-tailed)	.981	.004		.571	.001
	N	123	123	123	123	123
Overall, how satisfied are you with the current risk management practices in ODC transportation at Technip Energies?	Pearson Correlation	-.339**	.002	-.052	1	.429**
	Sig. (2-tailed)	<.001	.978	.571		<.001
	N	123	123	123	123	123
Do you think additional digital tool (like GPS, drones, or AI monitoring) should be implemented to improve ODC transportation safety?	Pearson Correlation	-.136	-.249**	.288**	.429**	1
	Sig. (2-tailed)	.133	.006	.001	<.001	
	N	123	123	123	123	123

### Interpretation:

The correlation analysis revealed strong relationships between training, monitoring, and overall risk management effectiveness. The results showed that enhanced training programs lead to greater risk awareness among employees and a reduction in operational issues during ODC transportation. A positive correlation was also observed between communication and coordination, indicating that well-coordinated teams experience fewer disruptions and delays. Furthermore, the integration of digital tools such as GPS tracking demonstrated a significant positive impact on monitoring accuracy and real-time decision-making. Overall, the findings suggest that strengthening employee training, adopting advanced digital monitoring systems, and improving stakeholder communication can collectively enhance transportation safety and efficiency within Technip Energies India.

## FINDINGS:

### Based on Risk Matrix Analysis:

- The Risk Matrix revealed that permit delays and accidents fall under the critical risk category, posing the highest impact on project timelines and safety.
- Vehicle breakdowns and weather disruptions were identified as high-risk factors, frequently causing operational delays.
- Risks such as route constraints and community resistance were rated as medium **risks**, indicating moderate but manageable effects.

### Based on Correlation Analysis:

- A strong positive correlation was observed between safety training, effective communication, and overall risk management efficiency, suggesting that better-prepared personnel and coordinated planning reduce incident likelihood.
- The correlation also indicated that digital monitoring practices (GPS tracking and real-time updates) are significantly linked with improved risk mitigation and timely transport execution.

## SUGGESTIONS:

- Strengthen digital monitoring systems (GPS/IoT) to improve real-time route tracking and early risk detection.
- Enhance training programs for drivers and logistics teams to build awareness of safety protocols and emergency handling.
- Establish a risk monitoring framework to periodically update the Risk Matrix based on project data and incident records.
- Encourage inter-departmental coordination to ensure that preventive measures are consistently implemented across all ODC projects.

## CONCLUSION:

The Risk Matrix and Correlation Analysis together reveal that permit delays, accidents, and weather-related issues are the most significant challenges in ODC transportation at Technip Energies India. The findings confirm that improved communication, training, and digital monitoring directly contribute to better risk control and overall operational safety. Strengthening these key areas will help the organization minimize delays, reduce accidents, and enhance efficiency in future ODC movements.

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