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Analyse The Time Delays Challenges In Over Dimensional Cargo Transportation

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Abstract: Over Dimensional Cargo (ODC) transit poses special logistical and operational issues because of its non-standard weight, dimension, and handling specifications. This research examines the main causes of ODC transportation time delays, with a special emphasis on port and road transit utilizing the Non-Vessel Operating Common Carrier (NVOCC) model. Careful planning is necessary for ODC shipments, including route surveys, obtaining permits, using specific equipment, and adhering to regulations. According to the report, there are inefficiencies in the current systems that cause major delays and higher operating expenses. These inefficiencies include complicated documentation, bureaucratic obstacles, infrastructure restrictions, and fragmented cooperation among stakeholders. The study assesses best practices in packaging, securing, and delivering ODC by examining a variety of cargo types, such as huge structures, offshore components, and heavy machinery. Additionally, it evaluates how technical, infrastructure, and environmental issues affect the transportation of freight. Through risk management techniques, contingency planning, and route feasibility studies, a particular focus is focused on the role that logistics service providers play in guaranteeing ODC shipping that is safe, fast, and compliant. The project provides solutions through qualitative and quantitative analysis, including the use of real-time tracking technology, simplified permitting procedures, improved safety measures, and integrated digital platforms for information sharing. The study's ultimate goals are to increase overall effectiveness, cut down on delays, and support environmentally friendly logistical techniques. Logistics companies, legislators, and industry participants working to maximize ODC transportation and satisfy the rising need for specialized cargo movement in industries like manufacturing, energy, and construction should use the findings as a guide

Key Points: Over Dimensional Cargo (ODC), NVOCC (Non-Vessel Operating Common Carrier), Delays, Logistics and the Infrastructure.

I. INTRODUCTION

Over Dimensional Cargo (ODC) is freight exceeding standard size or weight limits, requiring specialized equipment and handling. It includes large machinery, construction equipment, and oversized vehicles. ODC is used in industries like construction, energy, and manufacturing. Transportation involves specialized methods, permits, safety equipment, and careful route planning. ODC is more expensive but essential for unique shipping needs over Dimensional cargo carried as single divisible unit which exceeds the dimensional limits prescribed in Rule ninety-three of valuable Motor vehicle guidelines,1989 made under the Motor cars Act ,1988. There are certain basic elements to be intended during handling or moving of project cargos. The government has specific rules and laws when it comes to ODC goods. These shipments are often backed by safety norms and fines. The need for imposing laws is to refrain companies from taking unnecessary risks with important, dangerous, and fragile goods, hence, they have to abide by the safety rules established by the government.

II. NEED FOR THE STUDY

The transportation of Over-Dimensional Cargo (ODC) presents important challenges due to its oversized type, regulatory constraints, and infrastructure limitations. The complication of moving wide, heavy, or irregularly shaped cargo across various modes of transport makes necessary in-depth research into operational bottlenecks, handling methods, and safety obligations. Understanding these challenges is critical for improving performance, cost-effectiveness, and compliance accompanying worldwide standards. Additionally, the growing demand for heavy industrial equipment, wind turbines,

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and large machinery in sectors like construction, energy, and manufacturing further emphasizes the need for a structured approach to ODC logistics.

III. REVIEW OF LITERATURE

Meng, Huang, Zhang, & Jia, (2015). - This research introduces the classical Dijkstra algorithm into road network models for oversized cargo transportation. Their approach innovatively incorporates the turning direction at intersections as a weight value. This modification enhances the algorithm's ability to identify the most efficient paths.

Khachatryan (2020) examines various cargo transportation modes, with particular emphasis on the movement of dangerous and oversized heavy cargo. The article stresses the critical importance of implementing strict safety rules during such operations.

Bugayko and Popkowski (2021) conduct a study centred on transport safety issues in the planning, organization, and implementation of dangerous and oversized cargo transport. The research draws upon a range of available publications, expert opinions, and referenced source materials.

Awang et al. (2020) conducted a literature review analysing the current state of research on over-dimensional cargo transportation. Their work focuses on identifying both the challenges and opportunities within the industry. The authors emphasize that transporting oversized cargo requires specialized equipment tailored to specific logistical needs.

Shen et al. (2021) - A study by Shen et al examined the optimization of over dimensional cargo transportation using a multi-objective optimization model. The authors found that their model could help improve the efficiency and cost-effectiveness of transportation planning for over-dimensional cargo.

Zhang et al. (2020) - A literature review by Zhang et al. (2020) explored the challenges and opportunities for the transportation of wind turbine components, which are a common type of over-dimensional cargo. The authors identified several key challenges, including the need for specialized equipment, limited transportation infrastructure, and safety concerns. They also highlighted the potential benefits of using modular transportation systems and optimizing transportation planning.

Lin et al. (2021) - A literature review by Lin et al. (2021) examined the 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. Petruetal. discuss determining the parameters for safely passing oversized cargo on the road.

IV. OBJECTIVES OF THE STUDY

- To Analyze the Methods and Best Practices for Handling Over-Dimensional Cargo (ODC).
- To Identify the Challenges Associated with Different Modes of Transport and the Complexities in ODC Movement.
- To Identify and Assess the Key Challenges in the Transportation of Over-Dimensional Cargo Across the Industry.
- To Explore the Responsibilities, Processes, and Best Practices in Handling and
- Storing Dangerous and Hazardous Goods inner ODC Logistics.

V. RESEARCH METHODOLOGY

Research is defined as movement from the known tso the unknown. It is an effort to discover something. According to Ranjit Kumar said that "Research methodology is a procedural framework within that the research is conducted. It outlines the overall approach to the research from the hypothetical basis to the collection and analysis of data. "In this context, the research follows a framework combining descriptive analysis (to outline)

DATA COLLECTION

Data for the research study were gathered from two distinct sources: primary and secondary sources. However, using data that was gathered by another party is known as secondary data analysis. for another reason. Here, the researcher

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raises inquiries that are answered. through the examination of a collection of data that they did not help gather. The information was not gathered to respond to the particular research questions of the researcher, but rather gathered for a different reason. Thus, the identical data set might serve as a primary data set to one researcher and another researcher's secondary data set.

VI. CASE STUDY ANALYSIS

The case study method is a qualitative research method that involves an in-depth investigation of a particular person, group, or situation. It is commonly used in social sciences, business, education, and other fields to gain a detailed understanding of complex phenomena. A descriptive analysis of the case study method can help in understanding its key features, benefits, and limitations.

CASE STUDY ANALYSIS AND INTERPRETATION

CASE STUDY -1

Company: Prism Logistics Pvt Ltd
Client: Larsen & Toubro Ltd. (L&T) for HPCL Rajasthan Refinery Ltd. (HRRL)
Project Duration: August 2022 – July 2023
Project Value: Over ₹100 crore

CHALLENGES:

The logistics operations for L&T at the HPCL Rajasthan Refinery Ltd. project, Prism Logistics Pvt. Ltd. encountered some difficulties. High degrees of synchronization and transparency were necessary while coordinating amongst the various stakeholders participating in a large-scale industrial undertaking. Due to route limits, the requirement for specialized handling equipment, and intricate clearance processes, the transportation of large and over-dimensional cargo (ODC) presented operational challenges. The challenge was increased by the refinery's remote location in Rajasthan, where big consignments were difficult to convey due to inadequate infrastructure and accessibility. The logistical complexity was further increased by having to follow stringent delivery schedules while also adhering to various state-specific regulatory standards.

SOLUTIONS:

For better communication, effective collaboration, and real-time monitoring, Prism Logistics implemented a centralized digital project management system. To ensure efficiency and safety, they employed specialist equipment such as hydraulic axles and modular trailers for ODC transportation, and they carried out thorough route studies. To facilitate cargo transit, infrastructure improvements were performed in coordination with local authorities. Congestion was reduced and the timely supply of materials was guaranteed via a phased delivery strategy in line with the project's construction schedules. Permits, paperwork, and regulatory clearances were handled by a specialized compliance team to reduce delays and preserve continuous logistics flow.

RESULTS:

Prism Logistics Pvt. Ltd. successfully executed a complex multimodal transportation project for Larsen & Toubro Ltd. (L&T) in support of the HPCL Rajasthan Refinery Ltd. (HRRL) initiative. 34 super-heavy cargo units, each up to 743 metric tons in weight and up to 55 meters long and 9.7 meters in diameter, had to be transported from several ports to the refinery site in Barmer, Rajasthan, across a distance of almost 1,500 kilometres. The entire procedure, which took place between

August 2022 and July 2023, lasted almost a year and cost more than ₹100 crore.

CASE STUDY -2

ABS LOGISTICS

Headquartered in New Delhi, ABS Logistics is a recognized and respected international freight forwarder and freight forwarder with a strong presence in the oversized cargo logistics industry. ABS Logistics offers comprehensive and customized solutions to meet all logistics needs. ABS Logistics handled a 100 metric ton mobile crane en route from South Korea via the port of Mumbai to Bhopal in Madhya Pradesh.

CHALLENGES:

ABS Logistics there were lack of heavy-duty cranes at ports which caused the port that’s receiving to be limited in number of choices. ABS Logistics had to receive at a port which has this heavy-duty crane and skilled workforce needed to accomplish this deciding factor of the port becomes much more important here. SOLUTION: ABS Logistics had to

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implement routing alternatives and get expert consultation in importing this. ABS Logistics contracted special very low bed trailer truck.

SOLUTION:

ABS Logistics had to implement routing alternatives and get expert consultation in importing this. ABS Logistics contracted a special, very bed trailer truck.

ABS Logistics had to select a particular port that has the equipment and capacity to handle this heavy Equipment so that the transportation cost becomes lower.

RESULTS:

ABS Logistics overcame major logistical obstacles to successfully deliver the 100 metric ton mobile crane from South Korea to Bhopal, Madhya Pradesh. The business successfully overcame these challenges by selecting the best port that could accommodate such large cargo, even though there were not enough heavy-duty cranes available at the ports. Specialized low bed trailer trucks were used to finish the shipment, which lessened the difficulties caused by limited infrastructure. The crane was delivered on time and safely thanks to the company's choice to use alternative route techniques.

CASE STUDY -3

VECTOR GLOBAL LOGISTICS

Project Overview

- **Cargo:** Over-dimensional industrial machine weighing 5 tons
- **Transport Mode:** Multimodal (Sea and Road)
- **Timeline:** Critical delivery during the year-end holiday season

CHALLENGES:

- Time Sensitivity: Careful planning was necessary to prevent delays because the delivery timeline coincided with the Christmas season.
- Regulatory Compliance: obtaining specific permissions for big goods from Chinese ports and following Mexican transportation regulations, such as those pertaining to movement on weekends and at night. VectorGL.com
- Equipment Availability: A 14-ton crane with a high demand and restricted supply was sourced from Mexico. VectorGL.com
- Route navigation: controlling a 486-kilometer trip with an 80 km/h maximum speed limit that calls for exact synchronization

SOLUTION:

- Strategic Planning: Developed a comprehensive transportation plan, including securing necessary permits and coordinating with local authorities.
- Equipment Coordination: Quickly located the needed crane by utilizing well-established supplier networks.
- Real-Time Monitoring: To keep an eye on the shipment's progress and guarantee on-time arrival, real-time tracking was put into place.
- Regulatory Navigation: Acquired special permissions for the transportation of over-dimensional cargo in Mexico, guaranteeing adherence to regional laws.

RESULTS:

The transportation of the 5-ton over-dimensional industrial machine was successfully completed within the critical year-end timeline. Despite the difficulties of the holiday season, the machine was delivered on schedule thanks to the use of multimodal shipping, which comprised both road and marine components. All regulatory standards were satisfied thanks to the strategic planning and cooperation, and specific approvals for shipment via Mexico were secured, guaranteeing that no legal obstacles would impede the procedure. The project was carried out perfectly, ensuring that the transportation chain operated efficiently.

FINDINGS

Transportation issues in India because the most preferred mode of transportation is via road. Movement of goods is 60% done by road transportation which is actually inefficient due to poor road infrastructure, multiple check points and congestion Driver shortage with respect to drivers who can be skilful and drivers have very less amenities with driving

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longer distances. The number of axles and their dimensions play a key role. Lashing and Handling of fragile cargo has to be done with precaution. Incorrect or unbalanced stowage and inadequate weight distribution the challenges faced by project cargo handlers are numerable when planning route survey, choosing route alternatives, RTO restrictions, infrastructure and equipment shortage. Certain ODC cargos require special equipment such as lifting heavy duty mobile cranes and very low bed trailers which are scarce in this country. Challenges in Lashing such as cargo lashed has to meet the required standard which are under the supervision of the board-certified surveyor. Lashing equipment and workforce are harder to procure and utilise. The vehicle pilot or driver must be experienced and be skilled enough to adapt to the conditions and be able to make quick decisions in times of distress. This shortage of skilled Pilots adds to the challenge of transporting an Over Dimensional Cargo.

SUGGESTIONS

Having a single window system to synchronize Road Transport Officer, National Highways Authority of India, Railway authorities, Police Department, Public Works Departments in the state government would greatly improve the time taken to delivered Infrastructure in widening roads, bridges, toll roads have to be improved Driver welfare and health has to be closely monitored Ports need to have special infrastructure and equipment to handle these cargos. Modernisation of Roads and Bridges with the help of highways department. Most of the roads are not safe for transporting heavy haulage weighted vehicles but it is even more dangerous in the rainy seasons. This leads to more wear and tear of the vehicle. Infrastructure in Planning of Roads and Bridges and Dams are to be properly planned and executed. Mitigation of red tape/ Bureaucracy is required in improving the processing time of a shipment Toll Tax and other taxes have to be universal and similar in all geographical locations. With rapidly changing technology, usage of IoT Internet of Things can be implemented such as using drones for surveying and GPS tracking and immediate update regarding change in route pattern due to weather or other diversions. Automakers need to improve trucks with better engine performance with torque being higher. More options and choices in terms of equipment will be better for Project Cargo Logistics.Relaxation in the speed limit and the duration of travel can greatly benefit the delivery time. Promote usage of alternative energy equipment such as battery-operated forklifts and smaller equipment. More number of ports should improve their capabilities regarding special equipment which is needed to handle Over Dimensional Cargo in the Port sector. Depending on the size of the cargo escort require flags and lights. This helps the visibility of other drivers. Red, Orange and Amber lights should be placed in more areas of the vehicle.

CONCLUSION

Project cargos handled by Ocean generation shipping company requires special expertise ,care and detailing, Route surveying is the important factor or parameter to be done before transportation of a project cargo through roadways Implementing and handling Over Dimensional Cargo is challenging and extremely time consuming .Despite many challenges associated with over dimensional cargo transportation ,this field is very important to a various range of industries such as construction, mining, renewable energy. With proper planning, skilled expertise and advanced equipment, over dimensional cargo can be transported safely and efficiently. The make in India schemes have fuelled the growth of ODC packages. In the coming years Over Dimensional Cargo movement will be much more frequent project cargo handlers to break in new territories and handling equipment that will no doubt revitalise the project cargo sector. National Logistics Policy brings new sectors for production in defence, aerospace, power production. Project cargo would depend on the specific objectives of the project, the challenges encountered during the implementation and the achievement of the outcome. Successful completion of the establishment of new and improved logistics network that is more efficient, reliable and cost-effective.

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