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A STUDY ON TRANSPORTATION FLEET AND CARGO MANAGEMENT AT PYROLOGICS SYSTECH INTERNATIONAL

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Abstract

Cargo management plays a critical role in the logistics and supply chain industry, ensuring the efficient handling, storage, and transportation of goods. This paper explores the key components and modern practices in cargo management, including inventory control, documentation, cargo tracking, and risk mitigation. Emphasis is placed on the integration of digital technologies such as RFID, GPS, and cargo management systems (CMS) to enhance visibility, security, and operational efficiency. The study also examines challenges such as regulatory compliance, cargo damage, and cost control, proposing strategic solutions for optimization. By analysing case studies and current industry trends, the paper aims to highlight how effective cargo management contributes to seamless global trade and improved customer satisfaction.

Key words: Cargo, transportation, cargo tracking, customer satisfaction.

INTRODUCTION

In today's globalized economy, the demand for efficient, reliable, and cost-effective transportation has never been greater. Transportation fleet and cargo management are at the heart of modern logistics, playing a pivotal role in ensuring the smooth movement of goods across vast supply chains. Fleet management involves the administration of commercial vehicles such as trucks, ships, aircraft, and rail systems, with a focus on performance, maintenance, fuel efficiency, and regulatory compliance. Cargo management, on the other hand, encompasses the planning, handling, tracking, and delivery of goods to their intended destinations. Together, these systems are essential for minimizing delays, reducing operational costs, and improving overall service quality. As technology advances, the integration of GPS tracking, telematics, automated scheduling, and data analytics has revolutionized both fleet and cargo management, enabling real-time decision-making and greater transparency. This article explores the principles, challenges, and innovations in transportation fleet and cargo management, highlighting their strategic importance in the logistics and supply chain sectors.

STATEMENT OF THE PROBLEM

Many organizations struggle with inefficient fleet maintenance, leading to costly and untimely repairs, increased downtime, and ultimately higher operational costs for businesses that rely on their fleets for daily operations.

Additionally, high operational costs and fuel consumption remain major challenges, as companies often find it difficult to optimize fuel usage. Inefficiencies in route planning, driver behavior, and fuel management contribute to higher fuel costs and reduced profitability. Another issue businesses face is the difficulty in managing compliance with government regulations. The complexity and constant evolution of regulations governing fleet operations create significant burdens, and failure to stay compliant can result in legal penalties, fines, and reputational damage. Furthermore, many businesses operate with fragmented systems that lack integration, leading to disconnected software platforms for managing fleet operations. This results in data silos, missed optimization opportunities, and a lack of real-time visibility into fleet performance.

OBJECTIVES OF THE STUDY

Primary Objective

- To study the transportation fleet and cargo management in Pyrologics Systech International LLP

Secondary Objectives

- To analyze the transportation related problems and to analyze the tools and equipment used to handle cargo
- To analyze the measures of care taken on cargo and to analyze various other problems in transportation fleet
- To analyze the cargo management process during transportation.
- To provide suitable suggestions to improve the transportation fleet and cargo management in Pyrologics Systech International LLP.

Limitations of the Study

- Geographical limitations could restrict the study's generalizability due to diverse regional factors.
- Data availability and accuracy are potential issues, affecting the validity of findings.

REVIEW OF LITERATURE

Barbosa et al. (2020)[1] - discussed the challenges faced in collaborative logistics and fleet management. They identified barriers such as the integration of emerging technologies, cost- sharing mechanisms among collaborating firms, and optimizing the use of mixed vehicle fleets. Their research suggests that future studies should focus on developing systems that allow multiple companies to share fleets and logistics resources to improve efficiency and reduce operational costs.

Shidong Liang, Minghui Ma and Shengxue He et al., (2019)[2] - in this research article "Multi objective Optimal Formulations for Bus Fleet Size of Public Transit under Headway- Based Holding Control" they give solutions for the bus transportation with the development of advanced technologies for data collection, real-time bus control strategies have been implemented to improve the daily operation of transit systems, especially headway-based holding control which is a proven strategy to reduce bus bunching and improve service reliability for highfrequency bus routes, with the concept of regulating headways between successive buses. This hot topic has inspired the reconsideration of the traditional issue of fleet size optimization and the integrated bus holding control strategy.

Hongbo Du, Ziaul Huque, and Raghava R. Kommalapati et al., (2018)[3] - in their research "Impacts of Biodiesel Applied to the Transportation Fleets in the Greater Houston Area" they giving

idea to decrease fossil fuel use and greenhouse gas emissions from fleet vehicles, more and more biodiesel is used in vehicles in the Houston metropolis. The GREET model was used for simulating the fuel cycle emissions of diesel vehicles using different biodiesel blends in Houston. The energy and water use and from vehicles fueled with the blends were investigated. The study shows that the reductions in GHG emissions are significant at the Well-to-Pump stage, and all the emissions, except GHGs and, reduce at the Pump-to-Wheel stage. The overall Well-to-Wheel analysis shows that biodiesel is beneficial for both passenger cars and heavy duty trucks. However, the benefits are more pronounced for passenger cars compared to heavy duty vehicles. When 50% of diesel passenger cars and HDDTs are switched to B20 in the Greater Houston area in 2025, the daily GHG emissions will be reduced by 2.0 and 712.1 CO2-equivalent tonnes, respectively.

Zhao et al. (2018)[4] - reviewed the integration of smart technologies in transportation fleet and cargo management. They emphasized the use of machine learning, artificial intelligence, and big data analytics to optimize fleet operations. Their study found that predictive maintenance, route optimization, and real-time traffic analysis were some of the major advancements improving fleet efficiency. The use of data-driven insights allows fleet managers to make proactive decisions, enhancing operational efficiency, reducing downtime, and improving overall fleet performance.

RESEARCH METHODOLOGY

Research Design

The research design indicates the type of research methodology under taken to collect the information for the study.

Type of Research

Descriptive research includes surveys and fact-finding enquiries of different kinds. The major purpose of descriptive research is description of the situation as it exists at present.

Sampling Design

A Sample design is a definite plan for obtaining a sample from a given population. It is the procedure used in selecting items for the sample.

Sample Size

The company has around 300 employees who frequently travel to various ports and other locations for official purposes. A questionnaire was distributed among them, and only the filled-in responses were considered. After removing the incomplete ones, the final sample size was 120

DATA ANALYSIS AND INTERPRETATION

Inferential Analysis

Chi-square test between type of shipment handled and are the safety measures on dangerous goods are taken

AIM

To find out whether there is association between the Type of shipment handled and are the safety measures on dangerous goods are taken.

Null Hypothesis

H0: There is **no significant** association between the Type of shipment handled and Are the safety measures on dangerous goods are taken.

Alternative Hypothesis

H1: There is **significant** association between the Type of shipment handled and Are the safety measures on dangerous goods are taken.

Table Showing Chi-Square Test Between Type of shipment handled and are the safety measures on Dangerous Goods are Taken

Chi – Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	18.188[a]	4	.001
Likelihood Ratio	18.962	4	.001
Linear-by-Linear Association	10.645	1	.001
N of Valid Cases	120		
a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 2.92.			

Interpretation

The Chi-square tests (Pearson and Likelihood Ratio) show a significant association between the variables (p = 0.001). The Linear-by-Linear Association also indicates a significant linear trend (p = 0.001). However, 20% of cells have expected counts less than 5, which violates Chi-square assumptions. Thus, while the results are significant, caution is needed in interpretation.

INFERENCE

The Chi-Square test results show a significant association between the Type of shipment handled and Are the safety measures on dangerous goods are taken, as indicated by a p- value of 0.001 (p = 0.001 < 0.05). This suggests the rejection of the null hypothesis, indicating that there is a relationship between the type of shipment and whether safety measures are taken for dangerous goods.

One-Way Anova Test Between Whether Signalman Employed During Loading of Cargo in Container and type of Shipment Handled

AIM

To identify whether there is significant difference between the Type of shipment handled and Whether signalman employed during loading of cargo in container .

Null Hypothesis

There is no significant association difference between the Type of shipment handled and Whether signalman employed during loading of cargo in container.

Alternative Hypothesis

There is significant association difference between the Type of shipment handled and Whether signalman employed during loading of cargo in container.

Table Showing Anova Test Between Whether Signalman Employed During Loading of Cargo in Container and type of Shipment Handle

ONE-WAY ANOVA
Whether signalman employed during loading of cargo in container

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.304	1	1.304	5.522	.020
Within Groups	27.863	118	.236		
Total	29.167	119			

Interpretation

The One-Way ANOVA shows a significant difference in signalman employment during the loading of cargo in the container (p = 0.020). The F-value is 5.522, indicating between-group variation is significantly higher than within-group variation. Thus, the null hypothesis is rejected. There is a significant difference in signalman employment across the groups.

Inference

The One-Way ANOVA results show a significant difference in whether a signalman is employed during the loading of cargo in a container, depending on the type of shipment handled (p = 0.020). This suggests that the practice of employing a signalman during cargo loading varies significantly based on the type of shipment.

Coefficient of Correlation Test Between type of Shipment Handled and Mode of the Shipment

AIM

To find out whether there is significant relationship between the Type of shipment handled and Mode of the shipment.

Null Hypothesis

H0: There is no significant Correlation between the Type of shipment handled and Mode of the shipment.

Alternative Hypothesis

H1: There is a significant Correlation between the Type of shipment handled and Mode of the shipment.

FINDINGS

- The Chi-Square test results show a significant association between the Type of shipment handled and Are the safety measures on dangerous goods are taken, as indicated by a p-value of 0.001 (p = 0.001 < 0.05). This suggests the rejection of the null hypothesis, indicating that there is a relationship between the type of shipment and whether safety measures are taken for dangerous goods.
- The One-Way ANOVA results show a significant difference in whether a signalman is employed during the loading of cargo in a container, depending on the type of shipment handled (p = 0.020). This suggests that the practice of employing a signalman during cargo loading varies significantly based on the type of shipment.
- The Pearson Correlation of 0.295 indicates a moderate positive correlation between the type of shipment handled and the mode of shipment. This suggests that there is a tendency for certain shipment types to be associated with specific modes of shipment.
- We reject the null hypothesis p < 0.001. The significant impact of transportation damage on cargo arrival time suggests that reducing damage is crucial for ensuring timely delivery. Investing in better transport infrastructure and practices could lead to more predictable and reliable logistics.
- The Chi-square test results suggest a significant relationship between the categorical

variables, leading to the rejection of the null hypothesis ($p < 0.001$). Nevertheless, due to the violation of the test's assumptions, the reliability of these results is questionable, and further analysis or careful consideration is warranted before drawing firm conclusions about the relationship between the variables.

SUGGESTIONS

- More import shipments can be taken because import can give more profit than export.
- Machinery parts can be taken for export /import which gives maximum profit than any other goods.
- The signalman should be employed at all the necessary places for safer movement of cargo.
- Effective lifting equipment should be used properly.
- The package of the cargo should be made appropriately.
- Single window checking and certifying may reduce the time in every checking stations for fleet transportation.
- Government must reduce the rate of insurance, road tax, quarterly tax and income tax for fleet transportation.
- In this field competition is high, so the organizations go for innovative idea and adopt new technology like e-booking.

CONCLUSION

Technological advancements have significantly optimized material and cargo management, with modern lifting equipment streamlining handling processes. This project focused on identifying inefficiencies within Pyrologics Systech International LLP's transportation fleet operations. While the majority of shipments proceed without complications, a subset requires meticulous attention to prevent errors. This necessitates stringent oversight of equipment utilization, signalman communication, container integrity, and precise cargo weight and content verification. Accidental mistakes, though infrequent, highlight the need for consistent vigilance across all operational stages. To gain a comprehensive understanding of the company's transportation fleet and cargo management effectiveness, employee responses were collected and rigorously analyzed. The findings revealed that, despite generally smooth operations, specific areas required refinement. Consequently, the study provided Pyrologics Systech International LLP's management with actionable recommendations to enhance the overall efficacy of their transportation and cargo management systems, ensuring greater operational reliability and minimizing future discrepancies.

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