A STUDY ON ACCIDENT PREDICTION AND PREVENTION IN FREIGHT TRANSPORT AT CHENDUR CARRIERS PVT LTD

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Abstract
This project titled "Accident Prediction and Prevention in Freight Transport" at Chendur Carriers Pvt Ltd focuses on identifying the causes of road accidents in freight operations and evaluating preventive strategies. The study aims to analyse factors such as driver fatigue, poor infrastructure, overloading, and inadequate maintenance, which significantly contribute to freight-related accidents. With the increasing demand for efficient logistics, accident prevention has become essential for ensuring safety and operational continuity.

Using a structured questionnaire, data was collected from 110 employeesand analysed through ANOVA, Chi- Square, and Correlation using SPSS. The findings reveal that while awareness exists, there is inconsistency in applying safety measures like real-time risk analysis, training, and fatigue management. The study suggests improvements including AI-based monitoring, regular maintenance checks,and stronger enforcemen tof safety policies. This research highlights the need for proactive, technology-driven safety practices to reduce accidents and build a secure, efficient freight transport systemat Chendur Carriers Pvt Ltd.

Keywords: Freight Transport, Accident Prevention, Driver Fatigue, Safety Measures, AI – based Monitoring.

Introduction
Freight transport is a crucial component of global trade of commerce, facilitating the movement of goods from manufacturer to consumers across vast distances. As businesses expand and economic grow, the demand for efficient and reliable freight transport continues to rise. How ever with increased transportation activities, there is also a heightened risk of accidents, leading toloss of life, damage to goods, financial losses and operational disruptions. Accidents in freight transport can beattributed to various factors,including driver fatigue, mechanical mechanical- failure, adverse weather conditions, road infrastructure deficiencies and human errors. The logistics industry faces significant challenges in ensuring the safety of drivers, vehicles and transported goods. Accidents not only impact the efficiency of freight operations but also have legal and financial implications for business involved in transportation.

Objectives of the Study
1. Analyze the main reasons why freight transport accidents occur.
2. Research the variables that affect accident frequency and how they affect logistics.
3. To propose effective measures for accident prevention and risk mitigation in freight transport.
4. To recommend improvements in safety protocols,driver training and vehicle maintenance to enhance operational efficiency and reduce accident rates.
5. To evaluate role of technology such as telematics and ai, in predicting preventing accidents.
6. To assess the effectiveness of existing government regulations and compliance measure in ensuring freight transport safety.

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Need of The Study

1. Accident in freight transport have significant economic, operational and safety implications. The increasing frequency of accidents not only Leads to financial loses but also disrupts supply chains, causes cargo damage and endangers human lives.
2. Understanding the root causes of accidents and implementing preventive measures is essential for enhancing safety and efficiency in the logistics sector.
3. Traditionally, accident prevention in freight transport has viewed as a regulatory and compliance issue.
4. A systematic study of accident prediction and preventing can help identify recurring patterns and mitigate risks before they escalate.
5. The lack of effective accident prediction models has led increased insurance claims higher operational cost and reduced reliability in freight transport services.
6. Companies need to invest in predictive analytics,telematics,and ai driven monitoring system to minimize accident rates and enhance overall safety standards.

Scope of The Study

1. The goal of the study is to analyze the many elements that lead to freight transport accidents and find practical preventative measures.
2. It focuses on the role of driver behaviour, vehicle conditions, road infrastructure and environmental factors in accident occurrences.
3. The study examines how accident prediction models, telematics and real time monitoring systems can enhance safety in freight transport.
4. Insights from this report helps logistics companies to implement data-driven strategies to reduce accident risk and improve overall operational efficiency.
5. Policymakers, fleet managers, and other stakeholders will find the study's conclusions useful in creating stronger safety laws and enforcement strategies.
6. The researchwillalso contributeto improving industry best practicesin driver training, route planning and emergency response preparedness to minimize transportations related accidents.

Review of Literature

Ismail Abdul Rashid (2024) Transport- related explainable artificial lintelligence

Logistics: Road accident risk assessment. Auto accidents pose a severe threat to public safety worldwide, as they cause many injuries and fatalities annually.For use bydifferent stakeholders and decision- makers, this study offers a thorough, explainable artificial intelligence (XAI) artifact design that includes accident data.

Nirajan Shiwakoti (2025) Numerous research have examined the impact of repeated negative warnings on driver behavior,withparticular focusontheways in whichprior negative warnings influence responses to subsequent accurate FCWs. The impact of negative advanced driving assistance system warnings on thereactions of hazardous materials truck drivers is investigated using interpretable machine learning.

Research Methodology

The general approach and procedure used to gather, examine, and evaluate data in a methodical and structured way is referred to as research methodology.It guarantees the validity and dependability ofthe results and acts as a guide for carrying out the investigation.

In the framework of the project "Accident Prediction and Prevention in Freight Transport" at Chendur Logistics, this chapter describes the methods and approaches used for data gathering, sampling, and analysis.The chapter also discussesthe limits encountered during the study process and the instruments utilized to analyze the data.

Research Design
The strategy or framework for methodically gathering and analyzing data is known as the research design. This study's design consists of:
1. **Structured Questionnaire:** To collect answers from staff members at different levels, a closed-ended questionnaire was created.
2. **Descriptive Research:** The study uses descriptive research to assess awareness, preparedness, and opinions regarding accident prevention in freight transport.
3. **Data Analysis Techniques:** Using statistical methods including ANOVA, chi-square, and correlationtests via SPSS software, the gathered data was examined.

Sampling Techniques
Population: The population refers to the entire groupthat the research intends to study. In this case, the total number of employees involved in freight transport operations at Chendur Carriers pvt ltd was considered.

Sample Size: A sample size of 110 respondents was chosen using the random sampling technique. The sample includes drivers, maintenance specialists, supervisors, and logistics personnel.

Data Collection Methods
PrimaryData: A structured Google Form survey was used to gather primary data. Using a Likert scale format, the form contained research-oriented statements along with demographic information.
1. Questionnaire.
2. Google Form Distribution.

Secondary Data: Secondary data was used to understand theoretical frameworks and review literature relevant to accident prevention in freight transport. Sources include:
1. Websites.
2. Research articles.
3. Industry reports.

Limitations of The Study
1. The one-month period restrictedthe general breadth and depth ofthe project.
2. Data collection was minimal,and it limited the access to a varied and large data set.
3. The study was less relevant inmore general terms since it had to centre a particular site or business.
4. The data we use might not be accurate or complete, which can affect how wellthe system predicts the accidents
5. Setting up advanced predictionand preventions systems can be expensive, especially for smaller transport business.
6. Some things, like weather changes or unexpected road conditions, are just hard to predict with anysystem.

ANOVA
Hypothesis: H0 (Null Hypothesis): Opinions on vehicle maintenance across are not significantly diverse among age groups.

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H_1 **(Alternative Hypothesis):** The views of various age groups on car maintenance varies significantly.

Groups			
Within Groups	107.687	105	1.026
Total	126.364	109	

Interpretation
The ANOVA table above shows that the p-value is 0.002 and the F-value is 4.553, both of which are below the significance level of 0.05.This significantly refutes the null hypothesis. The attitudes of different age groups about car maintenance differ greatly from one another.Consequently, the alternative hypothesis is accepted and the null hypothesis is rejected.

Chi-Square
Hypothesis
H_0 **(Null Hypothesis):** Opinionsregarding vehicle maintenance do not significantly relationship with age group.

H_1 **(Alternative Hypothesis**): Opinions regarding car upkeep are significantly relationship with age group.
Chi-SquareTests

Vehicle Maintenance Is Regularly Conducted In Our Organization					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between	18.676	4	4.669	4.553	.002

	Value	df	Asymptotic Significance(2-sided)
Square	39[a]		
Likelihood Ratio	27.658	16	.035
Linear-by-Linear Association	.404	1	.525
Nof Valid Cases	110		
Pearson Chi-	34.8	16	.004

Interpretation
The chi-square test result is below the significance level of 0.05, with a p- value of 0.004 and a Pearson Chi-Square value of34.839.This impliesthat there is a statistically significant correlation between the respondents' opinions on auto maintenance practices and their age group. Consequently, the alternative hypothesis is accepted and the null hypothesis is rejected.

Correlations Hypothesis

H$_0$ (Null Hypothesis): There is no significant relationship between the frequency of freight accidents and the belief that most accident scan be prevented with the right tools.

H$_1$ (Alternative Hypothesis): There is a significant relationship between the frequency off right accidents and the belief that most accidents can be prevented with the right tools.

Correlations

		Freight Transport Operations Frequent Ly Face Road Accidents.	Most Freight Accident Scanbe Prevented With Theright Tools
Freight transport operations frequentlyface road accidents.	Pearson Correlation	1	-.268**
	Sig.(2-tailed)		.005
	N	110	110
Most freight accidents can be prevented with the right tools	Pearson Correlation	-.268**	1
	Sig. (2-tailed)	.005	
	N	110	110

Interpretation

The correlation table shows a negative correlation coefficient of -0.268, and the p-value is 0.005, which is below the significance level of 0.05.Thisimplies that there is a considerable inverse relationship between the incidence of accidents and the belief in accident prevention techniques.Consequently, the alternative hypothesis is accepted and the null hypothesis is rejected.

Suggestions

1. **Put Driver weariness Monitoring Systems in Place:** Given thatdriver weariness is a leading factor in collisions, logistics companies are advised to implement fatigue- detection technology and enforce rest periods to guarantee safe driving hours.
2. **Strengthen Safety Programs:** Because safety training is not always offered, businesses should plan regular, required training sessions for maintenance personnel, logistics operators, and new hires.
3. **Enhance Real-Time Route Risk Planning:** To help organizations lower accident rates, smart routing technologies that use telematics and GPS should be implemented.
4. **Strengthen Road Infrastructure Cooperation:** Given the importance of infrastructure, logisticscompaniesare encouraged to work with local and governmental agencies to report un safe roads and promotes afer freight routes.

5. **Standardize Vehicle Maintenance Procedures:** To reduce hazards associated with equipment, businesses should setup rigorous and planned maintenance inspections, particularly for fleets that transport industrial and mixed freight.
6. **Use AI to Predict Accidents:** Given that respondents think AI is valuable, businesses should spend money on predictive analytics technologies to identify high- accident regions and suggest safer procedures.

Conclusion

The purpose of the study is to ascertain Chendur Carriers pvtltd degreeof knowledge and procedures around accident prediction and prevention in the freight transport industry. Although accidents cannot be prevented, theycan be managed with responsive management and efficient safety measures. Companies should create smart and creative methodsto lower the number of accidents. A dedicated managerial team that is committed to implementing preventative systems consistently and responsibly is what isneeded. It isclear that viacarefully thought-out interventions, a culture ofopen communication, safety consciousness, and teamwork may help lower the number of accidents involving freight.

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