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A Study on Feasibility of Electric Vehicle for Logistics with Special Reference to Team Global Logistics Pvt Ltd., Chennai

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ABSTRACT: Electric vehicles (EVs) are automobiles powered primarily by electricity stored in onboard batteries. Unlike traditional internal combustion engine vehicles, EVs rely on electric motors for propulsion, offering a cleaner alternative to fossil fuel-powered cars. This shift toward electric propulsion represents a pivotal step in reducing greenhouse gas emissions and curbing reliance on finite fossil fuel resources. Beyond environmental benefits, EVs offer economic advantages through lower operating costs, as electricity is generally cheaper than gasoline or diesel. Additionally, advancements in battery technology continue to extend EV driving ranges, enhancing their practicality for daily commuting and long-distance travel, while initiatives to expand charging infrastructure aim to further integrate EVs into mainstream transportation systems, fostering a sustainable future for mobility. The objective of the study is to analyse on feasibility of electric vehicle for logistics with special reference to Team Global Logistics Pvt. Ltd., Chennai. The sample of the study is 120. Descriptive research design and convenience sampling method has been used. Questionnaire has been used as a primary data. Percentage analysis, Chi-square test, One Way Anova and T-Test statistical tools have been applied to reach the findings of the study.

KEYWORDS: Electric Vehicle, Operational Performance, Fleet Technology, Charging Infrastructure .

I. INTRODUCTION

Electric vehicles (EVs) are automobiles powered primarily by electricity stored in onboard batteries. Unlike traditional internal combustion engine vehicles, EVs rely on electric motors for propulsion, offering a cleaner alternative to fossil fuel-powered cars. This shift toward electric propulsion represents a pivotal step in reducing greenhouse gas emissions and curbing reliance on finite fossil fuel resources. Beyond environmental benefits, EVs offer economic advantages through lower operating costs, as electricity is generally cheaper than gasoline or diesel.

II. STATEMENT OF THE PROBLEM

Organisations are also deterred from switching to EVs by the hefty upfront expenses and unclear return on investment. Adoption is further hampered by the complexity of maintenance and repair, including the availability of qualified personnel and replacement parts. Another difficulty is integrating EVs with current logistics and fleet management systems, which has an impact on operational effectiveness and real-time tracking. Organisations risk increased operating expenses, inefficient delivery timetables, and a diminished competitive advantage if they don't have a workable EV adoption plan. Because logistical operations still rely on fossil fuels, which raises environmental issues, the impossibility of EVs also affects sustainability goals. By examining charging infrastructure, financial considerations, maintenance requirements, and technological integration, this study seeks to assess the viability of EVs in logistics. The study will assist organisations in improving operational performance, cost effectiveness, and sustainability in logistics by identifying important obstacles and offering suggestions.

Objctives of the Study

- To assess the charging infrastructure availability for seamless electric vehicle operations in logistics
- To evaluate the maintenance & repair costs for electric vehicles in logistics operations.

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- To analyze the capability of integrating electric vehicles with existing fleet management systems in the logistics operations
- To examine the operational performance of electric vehicles in meeting the performance demands of logistics operations in the company

III. REVIEW OF LITERATURE

Andrés Arias-Londoño (2020), In the last decade, the deployment of electric vehicles (EVs) has been largely promoted. This development has increased challenges in the power systems in the context of planning and operation due to the massive amount of recharge needed for EVs. Furthermore, EVs may also offer new opportunities and can be used to support the grid to provide auxiliary services. In this regard, and considering the research around EVs and power grids, this paper presents a chronological background review of EVs and their interactions with power systems, particularly electric distribution networks, considering publications from the IEEE Xplore database.

Ehrler, V. C., Schöder, D., & Seidel, S. (2021). More and more cities struggle to provide acceptable air quality and noise levels for their inhabitants. At the same time, urbanization is continuing, as is the need for supply with groceries in cities. Another ongoing trend is the growth of online shopping of groceries.Increase of online shopping in other areas, e.g. clothing, has resulted in augmented transport demand due to deliveries and returns. Therefore, an approach is needed to uncouple grocery supply related transport demand from emissions augmentation. This is only possible though, if transportation efficiency is further improved and if lower emission technologies (noise and fumes) are applied, e.g. electric vehicles.

IV. METHODOLOGY

The study has covered the Feasibility Of Electric Vehicle For Logistics With Special Reference To Team Global Logistics Pvt. Ltd., Chennai. Descriptive research design is employed in this study. Primary data for this study is gathered from a questionnaire. . The sample of the study is 120. Descriptive research design and convenience sampling method has been used. Questionnaire has been used as a primary data. Percentage analysis, Chi-square test and One Way Anova statistical tools have been applied to reach the findings of the study.

V. DATA ANALYSIS AND INTERPRETATION

	Categories	Frequency	Percentage
Gender of the respondents	Male	76	63.3
	Female	44	36.7
Educational qualification of the respondents	Upto HSC	24	20.0
	UG	29	24.2
	PG	51	42.5
	Diploma & Others	16	13.3
Years of experience in the logistics industry	Less than 1 year	12	10.0
	1-3 years	66	55.0
	4-6 years	26	21.7
	Above 6 years	16	13.3
Role within the logistics organization	Operations Manager	23	19.2
	Warehouse Manager	54	45.0
	Logistics Coordinator	21	17.5
	Transportation Manager	22	18.3

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The above table shows that majority (63.3%) of the respondents are male, the majority (42.5%) of the respondents have completed PG, the majority (55.0%) of the respondents have 1-3 years experience and the majority (45.0%) of the respondents are warehouse managers.

Operational Performance

	Excellent	**Good**	**Average**	**Bad**	**Poor**
Electric vehicles provide the required efficiency for logistics operations.	24 (20.0%)	56 (46.7%)	21 (17.5%)	12 (10.0%)	7 (5.8%)
EVs maintain consistent performance under varying load conditions.	42 (35.0%)	25 (20.8%)	29 (24.2%)	11 (9.2%)	13 (10.8%)
The acceleration and speed of EVs are suitable for logistics needs.	23 (19.2%)	10 (8.3%)	51 (42.5%)	25 (20.8%)	11 (9.2%)
The reliability of EVs matches that of conventional fuel-based vehicles.	48 (40.0%)	26 (21.7%)	19 (15.8%)	17 (14.2%)	10 (8.3%)
The operational performance of EVs significantly impacts their adoption in logistics.	17 (14.2%)	40 (33.3%)	15 (12.5%)	18 (15.0%)	30 (25.0%)

The above table shows that the majority (46.7%) of the respondents are good towards electric vehicles provide the required efficiency for logistics operations, the majority (35.0%) of the respondents are excellent towards EVs maintain consistent performance under varying load conditions, the majority (42.5%) of the respondents are excellent towards the acceleration and speed of EVS are suitable for logistics needs, the majority (40.0%) of the respondents are excellent towards the reliability of EVS matches that of conventional fuel-based vehicles and the majority (33.3%) of the respondents are good towards the operational performance of EVS significantly impacts their adoption in logistics.

Integration with Existing Fleet & Technology

	Strongly agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
EV adoption does not disrupt existing logistics operations.	27 (22.5%)	26 (21.7%)	36 (30.0%)	13 (10.8%)	18 (15.0%)
Route planning software is compatible with electric vehicle capabilities.	34 (28.3)	55 (45.8%)	12 (10.0%)	12 (10.0%)	7 (5.8%)
The company has developed a structured plan for integrating EVs	44 (36.7%)	25 (20.8%)	24(20.0%)	17 (14.2%)	10 (8.3%)

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into the existing logistics fleet.					
EVs can be seamlessly integrated with the company's current fleet management system.	19 (15.8%)	56 (46.7)	13 (10.8%)	12 (10.0%)	20 (16.7%)
Employees find it easy to adapt to the technological changes introduced by EV integration.	53 (44.2%)	23 (19.2%)	19 (15.8%)	12 (10.0%)	13 (10.8%)

The above table shows the majority (30.0%) of the respondents are neither agree nor disagree towards EV adoption does not disrupt existing logistics operations, the majority (45.8%) of the respondents are agree towards route planning software is compatible with electric vehicle capabilities, the majority (36.7%) of the respondents are strongly agree towards the company has developed a structured plan for integrating EVs into the existing logistics fleet, the majority (46.7%) of the respondents are agree towards EVS can be seamlessly integrated with the company's current fleet management system and the majority (44.2%) of the respondents are strongly agree towards employees find it easy to adapt to the technological changes introduced by EV integration

VI. CHI-SQUARE ANALYSIS -RELATIONSHIP BETWEEN THE NO. OF YEARS IN THE INDUSTRY AND OPERATIONAL PERFORMANCE

Null hypothesis (Ho): There is no significant relationship between the no. of years in the industry and operational performance.

Alternative hypothesis (H1): There is some significant relationship between the no. of years in the industry and operational performance

Chi Square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	46.614[a]	12	.000
Likelihood Ratio	54.527	12	.000
Linear-by-Linear Association	13.028	1	.000
N of Valid Cases	120		

a. 14 cells (70.0%) have expected count less than 5. The minimum expected count is .60.

INTERPRETATION:

As per the above table, it is inferred that the P value is 0.000; it is not significant to 5% (0.05) significant level. The minimum expected count is 0.60. Thus null hypothesis is rejected and it is finding that there is significant relationship between the no. of years in the industry and operational performance.

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VII. ONE WAY ANOVA TEST - 4.26 RELATIONSHIP BETWEEN THE ROLE WITHIN THE LOGISTICS ORGANISATION AND INTEGRATION WITH EXISTING FLEET & TECHNOLOGY

NULL HYPOTHESIS (HO): There is no significant relationship between the role within the logistics organisation and integration with existing fleet & technology.

ALTERNATIVE HYPOTHESIS (H1): There is a significant relationship between the role within the logistics organisation and integration with existing fleet & technology.

ANOVA

ROLE WITHIN THE LOGISTICS ORGANIZATION

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.396	4	1.349	1.386	.243
Within Groups	111.904	115	.973		
Total	117.300	119			

Interpretation

The table clearly shows that role within the logistics organisation and integration with existing fleet & technology has a figure on 1.386 values and significance around .243 level than the sum of squares between groups and within groups values have 5.396and 111.904 respectively. Hence, the significant value is greater than 0.05 for which the significant percentage is above 95%, hence null hypothesis. Thus, rejecting alternative hypothesis i.e., There is no significant relationship between role within the logistics organisation and integration with existing fleet & technology.

VIII. SUGGESTIONS

- To include EVs without interfering with logistics, the business should create a transition strategy.
- The business has to make sure that the route planning software complies with the criteria unique to EVs.
- The business must develop a methodical plan for incorporating EVs into the current fleet of logistics vehicles.
- The business ought to improve EVs' interoperability with the fleet management system in place.
- In order to assist staff in effectively adjusting to EV technology, the organization must support training initiatives.
- To satisfy logistical efficiency standards, the business must assess and improve EV performance.
- To guarantee dependability, the business should keep an eye on EV performance under various load scenarios.
- To decide if EVs are suitable for logistics, the organization must evaluate their acceleration and speed.
- To guarantee dependability, the business must compare the performance of EVs and traditional cars.
- The business should assess the effects of operational performance on EV adoption and implement the required changes.

IX. CONCLUSION

It is determined that a number of crucial elements, such as charging infrastructure, maintenance effectiveness, operational performance, and smooth integration with current fleet systems, determine whether electric vehicles (EVs) are feasible for logistical operations. Although EV adoption has long-term financial and environmental benefits, issues including battery replacement prices, accessibility to charging stations, and maintenance skills must be successfully resolved. To improve operating dependability, businesses must make investments in fast-charging networks, guarantee the availability of replacement parts, and provide expert training in EV maintenance. To reduce interruptions and increase logistical operations' efficiency, strategic planning for EV integration and route optimization is also crucial.

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