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A Conceptual Study on Electric Vehicles in Logistics and Transportation

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ABSTRACT: Climate change and global resource scarcity force a reconsideration of traditional individual mobility based on combustion engines. First electric vehicles are being developed as a result of technology advancements, and increasing market penetration is envisaged. However, when battery-powered electrical propulsion technologies become more widely used in the future, new challenges emerge for both the traditional automobile sector, as well as new firms such as battery manufacturers, power supply companies, and other service providers. Because of the varied Topical application examples of electric vehicles are covered, as well as a slew of economic opportunities.

KEYWORDS: electric vehicles; logistics and transportation; green vehicle routing problems

I. INTRODUCTION

Logistics and transportation (L&T) activities are an important part of global economies and contribute significantly to social and economic advancement in modern countries. The L&T industry's prominence is owing to its consistent expansion and impact on regional Gross Domestic Product. Finished product (GDP). Road L&T activities involving motorised vehicles, in particular, have expanded dramatically. in reaction to the rise of globalisation and cross-national commercial exchanges With the help of with the goal of increasing their efficiency, The Operations Department has done a lot of research on L&T systems. For decades, the OR/CS (Organic Research/Computer Science) communities. One of the most frequently discussed issues in the L&T literature is modelling and simulation, which has real-world applications. optimal vehicle tour assignments The Vehicle Routing Problem (VRP) [1] is a term used to describe this situation. Over the previous few years, numerous variations of this problem have been addressed. The most basic variation is the Capacitated VRP (CVRP), in which each customer has a certain demand that must be met without exceeding the vehicle's maximum capacity. The VRP with Time Windows adds time windows to the depot and customers, extending the CVRP. The conventional VRP has been redefined in numerous ways to account for extra real-world elements, which are commonly referred to as Rich VRPs [2] or Multi-attribute VRPs [3]. Despite the vast literature in the VRP field, the majority of existing contributions presume that the fleet to be managed only consists of internal combustion engines. Transport consumes a big portion of the oil consumed in regions like Europe and the United States, and road transport accounts for a significant portion of CO₂ emissions. transport activity as a whole Furthermore, the transportation industry as a whole accounts for around 28% of total emissions.GHG emissions in countries such as the United States. To help alleviate the problem, Incorporating emission costs as a goal to be minimised in routing models is one option.As a result, environmental and economic goals are traded off A different strategy is to use less polluting modes of transportation, such as plug-in hybrid electric vehicles (PHEVs) and electric cars (EVs), whose unique characteristics must be factored into appropriate routing models. As a result, as part of Modern cities urge fleets of automobiles to accept the programme to improve local air quality. alternative technologies, such as electric vehicles (EVs). Several factors are encouraging the adoption of these technologies, including that is beginning to be competitive in price. Electric vehicles (EVs) should be a top focus for reducing primary energy usage from both an environmental and an energy standpoint.

Electric Vehicles in Logistics and Transportation: A Survey on Emerging Environmental, Strategic, and Operational Challenges

Author : Angel Alejandro Juan 1,* , Carlos Alberto Mendez 2 , Javier Faulin 3 , Jesica de Armas 1 and Scott Erwin Grasman 4

This article looked at some of the existing literature on the introduction of electric vehicles in road transportation, with a focus on environmental difficulties, emerging strategic and operational challenges, and the usage of hydrogen electric vehicles as a substitute for other types of vehicles, new versions of the popular vehicle routing problem that arise as a result of electric vehicles; and the new variants of the popular vehicle routing problem that arise as a result of electric vehicles.

Exploring the challenges of electric vehicle adoption in final mile parcel delivery

Author: Anthony Anosike, Helena Loomes^b, Chinonso Kenneth Udokporo^a, and Jose Arturo Garza-Reyes

The general goal of this article is to investigate the challenges of EV adoption in final-mile logistics and, as a result, to identify relevant future research areas. Four research questions, RQ1 through RQ4, were created to do this.

- RQ1: In academic literature, what are the obstacles and barriers to implementing EVs in final mile operations?
- RQ2: How have carriers who have included EVs in their last mile operations dealt with or solved these challenges?
- RQ3: How do carriers who are considering introducing electric vehicles to their final mile operations view these challenges?
- RQ4: What are the prospective research directions that could help the industry embrace EVs more quickly?

To answer RQ1, a comprehensive review of the literature in this field was conducted using a thorough thematic idea map of the difficulties as a result of a systematic literature review To address RQ2 and RQ3, primary research in the form of semi-structured interviews was conducted with two of the industry's top five players. The data suggest that operational features, notably shift patterns, are the most important factor in determining the severity of the issues faced by potential EV adopters in final mile logistics. The need for frameworks and models for understanding and evaluating the obstacles of EV adoptions within certain operational features, as well as readiness and partnership frameworks, were identified as a result of this.

Modelling Reverse Supply Chain through System Dynamics for Realizing the Transition towards the Circular Economy: A Case Study on Electric Vehicle Batteries

Author: Yohannes A. Alamerew^{1*}, Daniel Brissaud¹

For a successful transition to a resource-efficient and circular economy model, this paper demonstrates the need for a shared understanding of the interplay among the building blocks of CE, such as business models, reverse supply chain, policy, product/service use, EoL recovery, and product/service design. A case study on electric car battery uses is also given and analysed, based on a study of organisations in the value chain. In addition, the primary facilitators and difficulties for circularity of EVBs in relation to the circular economy's building blocks are discussed. More research on the standardisation of EVB components and materials is needed. Standardization will enhance the number of wasted batteries that can be reused and the amount of material recovered. In addition, greater study on battery design for second life, smart and efficient logistics, and emerging EVB circularity solutions is needed. Based on the principles of system dynamics methodology, modelling of decision-making factors is completed in order to illustrate the dynamics of cost, revenue, strategic, and regulatory decisions.

New business models for electric cars: A holistic approach

Author: Christian Lerch , Fabian Kley, David Dallinger

This report demonstrated that various initiatives in the field of innovative business models have been sparked so far. Examining all of the business concepts proposed for the various components reveals that there are existing economic opportunities in all areas that should be pursued in the context of implementing electric drive systems. Despite this, their widespread adoption faces significant obstacles. Different organisations must not only go into new industries, but also redefine the value added shares between conventional and new stakeholders.

Life-cycle implications and supply chain logistics of electric vehicle battery recycling in California

Author: Thomas P Hendrickson^{1,2} , Olga Kavvada^{1,2} , Nihar Shah¹ , Roger Sathre¹ and Corinne D Scown¹

Based on the integration of LCA, supply chain optimization, and transportation logistics, this study proposes a modelling approach for quantifying the environmental and economic implications of expanding the supporting infrastructure network for PEV LIB end-of-life management. Incorporating recycling technology and using multimodal transportation in the supporting supply chain is critical in decreasing virgin LIB production burdens, according to our



findings. The possibility for LIB use in second-life applications, after vehicles have been retired but before being recycled, might help to alleviate this load while also providing the chance for full energy and emission return in the form of fossil fuel offsets. The value of LIBs will only rise as a result of this utilisation, as will the requirement for end-of-life efficiency and an efficient supply chain network.

Employing bibliometric analysis to identify suitable business models for electric cars

Author: Silvana Secinaro , Valerio Brescia , Davide Calandra * , Paolo Biancone

The goal of this research is to conduct a bibliometric analysis of publications on electric vehicle business models. Despite the fact that there is a large body of literature on the issue, we found that it lacked bibliometric analysis. Science-based mapping We looked at the workflow and several research questions. The current state of scholarly papers on the subject, as well as untapped data, future directions, and consequences We used the bibliometrix R-package to conduct a bibliometric analysis in order to appropriately answer these research questions The study emphasises the need of having a long-term strategy.

Supply Chain Management: An International Journal 2015

Author: Ines Österle

In order to assist local governments in managing urban freight, the importance of a decision-making framework to facilitate meaningful interaction among urban freight stakeholders has been highlighted in the literature (Ballantyne and Lindholm, 2014; Ballantyne et al., 2013; Lindholm and Blinge, 2014; Lindholm. This research uses a logical framework method to fill a gap in the literature approach for engaging urban freight stakeholders in the promotion of a sustainable urban environment, as applied to urban freight stakeholder involvement the supplier chain The use of the design and monitoring framework (DMF) approach resulted in a significant increase in productivity. To solve city logistics difficulties, a formal dialogue procedure with urban freight stakeholders has been established. in the Italian city of Como This research provides some novel insights into the management of urban freight, allowing the Included are the city authorities, receivers, carriers, and other local freight stakeholders. their hopes and dreams Despite their differing priorities, they have worked together since the commencement of the city's freight planning process. Lessons can be found in Bakewell and Garbutt (2005)'s logical framework approach literature. The findings of the Como urban freight stakeholder consultation indicate to both strengths and weaknesses. The applied DMF technique has some flaws.

II. CONCLUSION

This paper analysed some of the existing literature on the introduction of electric vehicles into road transportation, with a focus on environmental difficulties, growing strategic and operational challenges, and the usage of hydrogen electric vehicles as a substitute for other types of vehicles. new versions of the popular vehicle routing problem that arise as a result of electric vehicles; and the new variants of the popular vehicle routing problem that arise as a result of electric vehicles As a result of the introduction of electric cars into distribution fleets, As a result of this examination, It is clear that the utilisation of renewable energy sources in road logistics and transportation is becoming increasingly important than ever before, and is a key aspect in the development of an economically and environmentally sustainable society. a world that is steady The use of electric cars in road distribution, particularly in rural areas. There is a positive trend in metropolitan regions. Its full potential has yet to be discovered. The larger version, however, The usage of electric vehicles presents a slew of issues and obstacles that make planning more difficult. The following strategic and operational concerns can be addressed by operational research. the creation of battery recharging/swapping infrastructure networks, including the number, location, type, and capacity of connected stations; hybrid fleets with traditional cars, hybrid electric vehicles, and pure electric vehicles; the number and composition of hybrid fleets with both traditional vehicles, hybrid electric vehicles, and pure electric vehicles; the economic impact of electric car adoption across the entire supply chain To effectively address these issues, including dynamic and unpredictable scenarios, new optimization and hybrid optimization-simulation approaches must be developed. Step to facilitate the desired change toward more sustainable energy sources in logistics and Arena of transportation.

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