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IMPACT OF THE SPECIFICS OF ELECTRIC VEHICLES FUNCTIONING ON ACCOUNTING AND MANAGEMENT

Zlepko, A., Borykailo, T., Danchuk, I. (2025). Vplyv spetsyfiky funktsionuvannia elektromobiliv na oblik ta upravlinnia [Impact of the specifics of electric vehicles functioning on accounting and management]. *Visnyk ekonomiky – Herald of Economics*, 2, 199–210. DOI: 10.35774/visnyk2025.02.199.

Злепко А., Борикайло Т., Даньчук І. Вплив специфіки функціонування електромобілів на облік та управління. *Вісник економіки.* 2025. Вип. 2. С. 199–210. DOI: 10.35774/visnyk2025.02.199.

Abstract.
Introduction. *Electrification has emerged as a key trend in the evolution of road transport, driven by the structural divergence of electric vehicles (EVs) from internal combustion engine (ICE) vehicles and their potential for efficient deployment in commercial operations. Economic benefits resulting from EV utilization materialize under conditions of active implementation within sectors such as taxi services, parcel delivery, logistics,*

and marketing. These developments necessitate a transformation of accounting and information systems, along with adaptation of managerial accounting processes to reflect the operational specificities of electric transportation.

The aim of the article *is to refine the methodology for accounting and operational management of enterprises operating electric vehicle fleets, through identifying key differences between EVs and conventional ICE vehicles in terms of functional and economic characteristics.*

Results. *The advantages of electric vehicles – cost-efficiency, environmental sustainability, and optimization potential – are emphasized. Given the technological distinctiveness of EVs compared to ICE vehicles, accounting and managerial frameworks require revision, accounting for factors such as electricity as the primary energy source, charging infrastructure demands, newly relevant measurement units, high-voltage traction batteries, specialized vehicle components and spare parts, differentiated taxation policies, and the significant influence of environmental conditions. The study substantiates the need to adapt accounting systems to provide accurate financial data, enable effective operational control, and support decision-making in the domain of electric fleet management.*

Prospects. *Despite their advantages, electric vehicles face several operational constraints stemming from their unique structural and functional properties. Further research is required to develop accounting-based approaches for optimizing transport routing and freight/passenger flow management in EV logistics.*

Keywords: *accounting, management, road transport, electric vehicles, electricity.*
Formulas: 0, fig.: 1, tabl.: 2, bibl.: 12.
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Introduction. Electrification constitutes the latest development in road transport systems. While hybrid vehicles have maintained a presence in the automotive market for some time, the production of fully electric vehicles has gained momentum only recently. EVs exhibit fundamental design differences from ICE vehicles, with key systems engineered for energy intake, storage, and consumption.

The growing prevalence of EVs across commercial enterprises reflects their comparative advantages. Commercial deployment becomes economically viable when the anticipated benefits outweigh the relatively high acquisition costs. The commercial potential of EVs can be fully realized through intensive use, particularly in sectors such as taxi services, grocery delivery, logistics, and advertising.

To unlock economic returns, enterprises must establish efficient accounting and management systems tailored to EV operations. Transformational changes in the methods and organization of accounting and managerial processes require thorough investigation into the formation of decision-relevant accounting data, especially considering the operational differences between electric and ICEvehicles.

Analysis of research and publications. The operational integration of electric vehicles into enterprise activity, particularly under changing managerial paradigms for EV fleet operators, has become an increasingly prominent subject within the academic community. In 2024, the majority of scholarly publications addressing the economic application of

EVs originated from researchers based in Ukraine (46.58%), the United States (11.54%), Kazakhstan (9.83%), China (7.91%), and the United Kingdom (6.41%) (Figure 1).

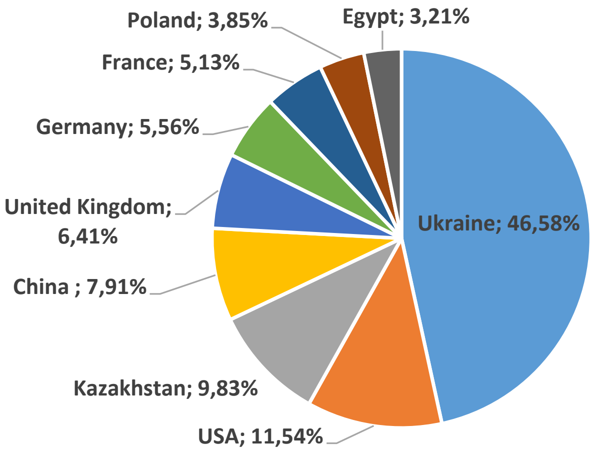

Fig. 1. Leading countries by volume of academic publications on commercial use of electric vehicles in 2024.

Source: compiled based on [1], excluding countries designated as aggressors in military conflicts.

Dung Nguyen highlighted cost structure changes faced by enterprises during the transition to sustainable vehicle use, emphasizing depreciation of specific EV components [2]. Parallel research by Borysiak O. and collaborators examined electric vehicle deployment within decarbonization strategies and enterprise management optimization [3]. Prospects for automating accounting and operational oversight in passenger transport – including electric fleets – were explored by Zadorozhnyi Z.-M and colleagues [4].

Abuqila Mohamed, Nassar Yasser, and Nyasapoh Mark investigated variables affecting operational lifespan and mileage performance of commercial EVs [5]. Derii V., Humenna-Derii M., and Kruchak L. outlined the need for expenditure control within construction enterprises, linking it to improved transport and logistics processes [6]. Studies by Ramakrishnan Sankaran and Khapane Prashant focused on component durability, with the goal of failure prediction and preventive maintenance scheduling to avoid interruptions in EV utilization [7]. Muravskyi V. proposed a framework for digitalization and cyber protection of operational transport data, based on principles of autonomy [8]. Awan Muhammad and Scorrano Mariangela introduced the total cost of ownership (TCO) framework for assessing economic efficiency in commercial EV deployment [9]. Qin Zhikun and co-authors presented a comprehensive classification of EV operating expenses through comparative analysis with ICE vehicles [10]. Moon Joon and collaborators developed a methodology for route and flow optimization of commercial EVs aimed at improving economic and time-efficiency indicators in fleet operations [11]. Strategic transformation of EV management within the scope of energy innovation management was analyzed by Amel Bounar, Boubertakh Hamid, and Arbid Mahmoud [12].

Despite the expanding body of literature addressing the managerial dimensions of EV operation, insufficient attention has been devoted to the accounting frameworks required for enterprises managing electric fleets. This trend becomes evident when examining the distribution of 2024 publications on EV-related topics across scientific disciplines (tabl. 1).

Table 1

Distribution of 2024 publications on electric vehicle topics by academic field

№	Scientific field	Part
1.	Engineering	43.25%
2.	Energy	11.16%
3.	Computer Science	10.79%
4.	Mathematics	8.66%
5.	Materials Science	7.33%
6.	Physics and Astronomy	6.16%
7.	Environmental Science	2.74%
8.	Earth and Planetary Sciences	2.22%
9.	Chemical Engineering	2.01%
10.	Social Sciences	1.97%
11.	Decision Sciences	1.45%
12.	Business, Management and Accounting	0.97%
13.	Chemistry	0.77%
14.	Agricultural and Biological Sciences	0.28%
15.	Medicine	0.24%

Source: formed based on [1], the rating does not include publications from countries recognized as aggressors in military conflicts.

Only around 1% of all scientific publications on electric vehicles in 2024 address accounting and management issues, signaling a concerning trend.Without thorough development of accounting and managerial frameworks for EV operations, commercial deployment projects are unlikely to succeed, thereby defining the rationale for this research.

The aim of the article is to refine the methodology for accounting and operational management of enterprises operating electric vehicle fleets, through identifying key differences between EVs and conventional ICE vehicles in terms of functional and economic characteristics. The research hypothesis assumes a fundamental difference between Evs and ICE vehicles, significantly influencing accounting and management practices in the context of energy efficiency, cost-effectiveness, environmental sustainability, and the optimization of Evs for commercial purposes.

Results. A synthesis of existing academic contributions highlights the benefits of utilizing electric vehicles for business purposes. First, cost-efficiency emerges due to the lower price of electricity compared to traditional fuels used in ICE vehicles. Additional economic gains result from reduced maintenance and repair costs, as EVs typically contain fewer mechanical components.

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Environmental sustainability represents another major advantage, with minimal or zero pollutant emissions released into the atmosphere. Optimized vehicle management further contributes to autonomous, safe, and predictable transportation operations. The integration of EVs into commercial activities facilitates accurate route planning and cost forecasting – key drivers of transport service digitalization.

Ensuring cost-efficiency, sustainability, optimization, and planning capabilities provides a foundation for transforming both accounting methodology and management systems. The transformation must address specific characteristics of EV operation, including electricity as the primary energy source, charging requirements, revised measurement units, the presence of high-voltage traction batteries, the use of non-traditional components and spare parts, altered or simplified tax and fee structures, and the heightened influence of environmental conditions.

Electricity. The type of energy used by a vehicle fundamentally distinguishes electric vehicles (EVs) from internal combustion engine (ICE) vehicles. Electricity functions as the primary driving force behind EV mobility. In the context of a transport enterprise, the need arises for a segregated accounting of electricity consumed for charging EVs, as distinct from electricity allocated to other operational systems.

To meet this requirement, installation of separate metering devices for electricity usage is necessary. Depending on the intended use of EVs, the classification of operating expenses reflecting electricity consumption may vary. Such costs may be recognized only upon verification of energy use by the specific vehicle. The charging process can be treated as an internal transfer of purchased or self-generated electricity – from the energy supplier or auxiliary production unit – to the designated vehicle.

Using end-of-day data on electricity levels and consumption per vehicle, enterprises may allocate corresponding values to relevant operating expense accounts. Unlike ICE vehicles, EVs offer precise tracking of energy consumption, thereby ensuring a high degree of accuracy in electricity accounting.

In contrast to fuel and lubricants, electricity poses substantial challenges for accumulation. Except under frequent blackout conditions, storing electricity at enterprise level generally proves inefficient. While fuel reserves are maintained to avoid operational disruption, electricity remains consistently accessible either from centralized grids or internal generation sources. This simplifies resource availability for fleet operations. Furthermore, EVs require few technological fluids for operation, significantly lowering maintenance expenditures.

Energy Replenishment. Transport enterprises managing EV fleets must consider downtime associated with battery charging in their operational planning. During the charging process, vehicles remain non-operational, prompting the need for activity scheduling aligned with charging cycles. Charging at night or during off-peak idle periods aligns best with work schedules. However, under high usage intensity, forced transition to scheduled technological downtime becomes necessary.

To offset productivity losses, management may deploy backup vehicles. Such reserve fleets may consist of either EVs or traditional ICE vehicles. During regulated downtime, enterprises should establish a remuneration structure for employees affected by these intervals. Since such interruptions do not stem from driver or technician fault, full wage retention is advisable.

An alternative involves specifying differentiated pay rates – active duty versus downtime – in employment contracts and job descriptions. The accounting system should support wage calculation by time interval, accommodating these distinctions. Additionally, staff may be reassigned to auxiliary business tasks during technological idle periods to optimize labor utilization.

Measurement Units. The operation of electric vehicles requires the use of new measurement units that differ significantly from those applied to internal combustion engine (ICE) vehicles. The key unit relevant to EV operations is the kilowatt-hour (kWh). Battery capacity, remaining energy levels, electricity consumed, and the volume of electricity sourced from the grid are all measured in kilowatt-hours.

EV performance can be assessed using metrics such as kilometers traveled per kilowatt-hour, or inversely, the number of kilowatt-hours required to travel one kilometer. Additional performance indicators include the state of charge of the high-voltage traction battery, typically expressed as a percentage of its original capacity. The maximum energy intake from the grid during a single charge cycle also serves as a vital parameter.

These units support evaluation of battery degradation and determination of residual value. Frequently, residual value serves as a proxy for estimating current market value. Other useful metrics include the number of charge/discharge cycles and charging patterns across different types of charging stations.

Battery System. The high-voltage traction battery represents a critical component that fundamentally differentiates electric vehicles from ICE vehicles. Compared to other EV systems, the battery undergoes accelerated wear due to chemical degradation over time, resulting in diminished capacity and reduced service life.

Modern EV batteries operate effectively for an average of 10 to 15 years, after which replacement becomes necessary. This operational lifespan often falls short of the overall vehicle lifespan. Therefore, it becomes appropriate to apply two distinct depreciation methods in accounting: one for the battery and another for the vehicle itself.

For the battery, accelerated depreciation methods offer advantages by facilitating the creation of a targeted depreciation fund. This reserve may later finance battery replacement without requiring additional capital expenditure.

Depreciation of the EV, excluding the battery, may follow any standard method. However, the functional role of the EV within the enterprise should influence depreciation allocation across production, general production, administrative, distribution, or other cost categories. If EVs are used directly in revenue-generating transport services, depreciation charges should be recorded under production or overhead costs. In all other cases, depreciation accounting aligns with that of conventional ICE vehicles.

Components and Spare Parts. Accounting for electric vehicle operations must reflect the specific wear characteristics of EV tires. Due to the unique driving dynamics of electric vehicles, standard tires exhibit approximately 20% faster tread wear compared to their use on internal combustion engine (ICE) vehicles, according to research findings. Leading tire manufacturers now offer specialized EV-specific models, such as Michelin e.Primacy, Hankook iON evo, Bridgestone Turanza Eco, Pirelli P Zero Elect, Bridgestone Potenza

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Sport Enliten, Michelin Pilot Sport EV, Continental UltraContact, among others. These tires are characterized by reduced rolling resistance and lower weight, though their unit cost exceeds that of conventional tire alternatives.

Procurement planning must consider vendor offerings of EV-specific tires and reflect elevated cost projections in the spare parts budget. Use of specialized tires increases vehicle range per charge and enables prediction of tire lifespan based on manufacturer specifications. Management gains access to more accurate planning data for fleet performance and maintenance scheduling.

Other vehicle components typically exhibit extended service life and require less frequent replacement. Items such as the 12-volt auxiliary battery, drive belts, and brake pads experience minimal wear due to regenerative braking and EV drivetrain mechanics. These characteristics support longer operational cycles and extended maintenance intervals, offering enhanced reliability and planning predictability.

Taxes. Given the minimal environmental footprint of EVs, transport enterprises benefit from streamlined taxation and regulatory compliance. Most notably, ecological tax obligations are reduced or eliminated due to the absence of tailpipe emissions. In several municipalities, EVs are also exempt from parking fees.

Moreover, acquisition of electric vehicles may qualify for exemptions or reductions in import duties and registration-related taxes. These fiscal incentives enable enterprises to transition to simplified tax regimes or avoid certain costs associated with vehicle acquisition and operation.

Environmental Conditions. Weather and road conditions exert significant influence on the operational stability of electric vehicles. Extreme cold or heat reduces the effective capacity of the battery, often decreasing the estimated travel range. Similarly, the need to heat or cool the vehicle cabin negatively impacts driving distance.

Effective route planning by enterprise management must account for the load weight carried by EVs. Increased cargo weight reduces range, as do suboptimal road conditions. Unpaved roads, frequent elevation changes, snow, and mud not only decelerate EV movement but also significantly diminish range performance.Management bears the responsibility of forecasting external conditions and estimating distance capability under specific environmental and operational scenarios.

Other Factors. Additional external variables affect EV fleet accounting and management. For instance, insurance premiums may vary substantially based on vehicle age and battery condition. Enterprises face challenges in predicting long-term insurance expenses, especially for EVs used in commercial operations. Continuous market analysis becomes essential to select optimal insurance packages from various providers.

Personnel involved in EV operations require retraining. Differences in technical components, operational procedures, and cost allocation methods necessitate updated knowledge for technical, economic, and managerial staff.

Table 2 summarizes the key operational features that distinguish electric vehicles from internal combustion engine models and outlines their implications for accounting and enterprise management.

Table 2

Key features of electric vehicle operation
with impact on accounting and management systems

№	Features of electric transport	Impact on accounting and management
1.	Electric energy	Accounting for electricity write-offs as part of various enterprise expenses.
2.	Electricity replenishment	Accounting for electricity consumption, accumulation and use as part of energy management.
3.	Units of measurement	Handling new units of measurement that characterize electricity use and describe the condition of an electric vehicle.
4.	Battery	Specific accounting and depreciation of the battery separately from other units and spare parts of a car.
5.	Units and spare parts	Accounting for current repairs and planning expenses taking into account the absence or specificity of the functioning of units and spare parts of an electric vehicle.
6.	Taxes and fees	Simplified system of taxation and accounting for taxes and fees
7.	Environmental conditions	The need to take into account environmental conditions when managing the activities of enterprises
8.	Other factors	Other factors affecting accounting and management

Source: systematized by the authors themselves.

Recognition of the operational differences between electric vehicles (EVs) and internal combustion engine (ICE) vehicles serves as a basis for refining accounting methodologies and managerial structures. Each factor reflects specific characteristics of enterprises operating EV fleets in commercial processes. Transformational shifts in accounting and managerial practices stem from the optimization of commercial fleet operations and require further in-depth research to improve financial and operational reporting systems.

Conclusions. The modern automotive market offers a wide selection of electric vehicle models. Enterprises increasingly integrate electric transport into their business operations. The rationale behind EV deployment includes cost-efficiency, environmental sustainability, and streamlined operational management.Fundamental distinctions between EVs and ICE vehicles call for a revised approach to financial accounting and enterprise management. Key influencing factors include:Electricity – accounting for energy consumption across cost categories;Energy Replenishment – Tracking electricity use, storage, and distribution as part of energy management;Measurement Units – application of new indicators to monitor energy usage and vehicle condition;Battery System – specific depreciation policies for high-voltage traction batteries, treated separately from vehicle components;Components and Spare Parts – maintenance planning based on reduced or unique part wear;Taxes– simplified tax regimes and exemption structures for EVs;Environmental Conditions – incorporation of weather and terrain factors into operational planning;Other Considerations – including insurance dynamics and workforce retraining.

These transformational changes in accounting and management practices enable the generation of accurate financial data on EV operations, determination of full service cost, enhanced control over business processes, and improved management of transport enterprises.

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ВПЛИВ СПЕЦИФІКИ ФУНКЦІОНУВАННЯ ЕЛЕКТРОМОБІЛІВ НА ОБЛІК ТА УПРАВЛІННЯ

Анотація.

Вступ. *Електрифікація стала ключовим трендом у розвитку автомобільного транспорту, що зумовлено конструктивними відмінностями електромобілів від традиційних автомобілів та їх потенціалом ефективного використання у комерційній діяльності. Позитивний економічний ефект від експлуатації електромобілів досягається за умови їх імплементації у сферу таксі, доставки, логістики, маркетингу тощо. Це потребує трансформації обліково-інформаційних процесів та адаптації системи обліку й управління відповідно до специфіки функціонування електричного автотранспорту.*

***Мета статті** – уточнення методики обліку та управління діяльністю підприємств, які є операторами електромобілів, у контексті ідентифікації специфіки їх функціонування у порівнянні з автомобілями з двигуном внутрішнього згоряння.*

***Результати.** Наведено переваги використання електромобілів, серед яких економічність, екологічність та можливості оптимізаційного управління. Зазначено, що функціональні особливості електромобілів, на відміну від автомобілів з* *двигунами внутрішнього згоряння, вимагають трансформації обліку та управління діяльністю підприємств з урахуванням таких чинників: електроенергія – основний рушій пересування, необхідність поповнення запасу електроенергії, актуалізація нових одиниць виміру, наявність високовольтної тягової батареї, інші – відмінні від традиційних автомобілів агрегати та запасні частини, зміна або спрощення податків і зборів, значний вплив зовнішніх умов навколишнього середовища тощо. Обґрунтовано необхідність адаптації системи бухгалтерського обліку та управління для забезпечення достовірної інформації, ефективного контролю і прийняття управлінських рішень у сфері експлуатації електротранспорту.*

Перспективи. *Експлуатація електромобілів пов'язана також з певними обмеженнями, які є результатом їх конструктивних та функціональних особливостей, що потребує подальших досліджень з обліково-інформаційного обґрунтування оптимальних транспортних маршрутів та транспортних потоків перевезення вантажів чи пасажирів.*

Ключові слова: *облік, управління, автомобільний транспорт, електромобілі, електроенергія.*

Формули: 0, рис.: 1, табл.: 2, бібл.: 12.

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