
CHAPTER 7

Shared use of transport as a component of the circular economy in relation to achieving sustainable development goals

Alla Karnaushenko
Lesia Kononenko
Viktoriia Petrenko
Yuliia Hlavatska
Nataliia Sysolina
Iryna Sysolina

Abstract

The study aims to substantiate the feasibility of implementing models of shared transport as a tool for applying the principles of circular economy (CE) in the context of achieving Sustainable Development Goals (SDGs), focusing on rural territorial communities in Ukraine. The paper proposes an assessment of the economic, environmental, and social effects of implementing shared transport programmes at the local level. Methods of case analysis, correlation analysis, logical generalization, and a structural-functional approach have been applied. Direct effects of car-sharing implementation in the Adzhamka territorial community have been calculated: a reduction of CO₂ emissions by 13.68 tons per year and an annual saving for users of up to 43,000 UAH. Three hypotheses regarding the effectiveness of the sharing transport model have been tested: it has been proven that it provides comprehensive sustainable development effects, depends on the digital readiness of the population, and is financially sustainable in a cooperative format. The study identified structural barriers to scaling the sharing economy (SE) in rural areas, including the digital divide and insufficient levels of social activity within communities. The potential of shared mobility models for rural regions in the post-war period has been summarized. An approach to assessing the viability of local models has been proposed, based on a combination of environmental indicators, household costs, and the level of digital inclusion.

The scientific novelty of the research lies in the combination of CE and SE concepts at the local level and the justification of shared transport's effects in rural territorial communities. Future research perspectives include a sociological study of

the perception of sharing models among different population groups, a comparative analysis of communities with varying levels of digital maturity, and the integration of smart mobility into circular strategies.

The research has an applied and empirical nature.

Keywords

Circular economy, sustainable development, sharing economy, shared mobility, car sharing, digital transformation, rural communities, environmental impact, digital divide, cooperative models.

7.1 Introduction

In the 21st century, humanity has faced unprecedented global challenges, including the rapid depletion of natural resources, environmental degradation, anthropogenic climate change, and rising social inequality. These processes are primarily driven by the dominance of a linear economic model that focuses on one-sided consumption of resources under the principle of "take-make-dispose". In response to these systemic threats, the global scientific community and international political institutions, including the United Nations, are advocating for the transformation of economic development based on the CE principles. This paradigm entails closed loops of resource use, reduction in waste volumes, and minimization of negative environmental impact to achieve the SDGs.

CE, which combines economic feasibility with environmental responsibility, is a strategic foundation for building an innovative and inclusive future economy. However, despite the conceptual appeal and the widespread usage of relevant terminology in political and scientific discourse, the level of circularity in the global economy, according to the Circularity Gap Report 2024, remains critically low and shows a downward trend. It indicates the need to redirect attention from the normative to the applied level, particularly through the study of tools capable of ensuring the CE implementation principles at the local level.

One such tool is SE, which allows for increased efficiency in resource utilization without significant infrastructure investments. The study of transportation sharing models (in particular, car sharing) is becoming increasingly relevant as one of the most dynamic segments of SE, which has the potential to contribute to environmental, economic, and social benefits simultaneously. In rural areas, where access to infrastructure is limited and the level of digitalization remains inadequate, these models may become essential in ensuring a sustainable mobility environment and social integration, particularly for internally displaced persons in the context of the war in Ukraine.

The research aims to conceptualize and empirically substantiate the shared use of transport as an effective mechanism for implementing the CE principles in relation to achieving the SDGs, taking into account the socio-economic specifics of rural areas in Ukraine.

To achieve the set goal of the research, scientific hypotheses have been formulated, the verification of which allows for the identification of key factors influencing the effectiveness of implementing shared transport models in the context of the circular transformation of rural communities:

H₁: shared transport in rural areas can be an effective form of implementing the CE principles, providing ecological, social, and economic benefits simultaneously.

H₂: digital competencies and access to digital infrastructure are key prerequisites for successfully implementing SE models in rural environments.

H₃: a cooperative form of organization and inclusive participation of the local community ensure the financial viability and social legitimacy of shared transport programmes.

The methodological basis of the research is an interdisciplinary approach that combines elements of economic theory, sustainable development, digital transformations, sociology, and environmental management. This approach has enabled a comprehensive assessment of the potential of transport-sharing models as a tool for implementing the CE principles in relation to SDGs.

The research has been conducted in several stages using the following methods:

1. Analysis of literary sources and conceptual framework – a review of domestic and foreign scientific literature on CE, SE, digital transformation, and sustainable development has been conducted. A comparison of the 3R, 6R, and 9R models has been carried out, and the concept of SE has been systematized across various research approaches.

2. System-structural analysis has been used to identify the interconnections between the key elements of the CE concept, digitalization, and resource sharing within the structural transformation of consumption models. Particular attention has been given to studying interactions between the economic, ecological, and social subsystems.

3. Case method – a case study of the Adzhamka territorial community in the Kirovohrad region has been used to empirically verify hypotheses, analyzing the possibilities for implementing a transport sharing model. Economic costs and benefits, the population's digital readiness, the project's social significance, and its environmental impact have been evaluated.

4. Quantitative analysis – an assessment of the ecological effect (reduction of CO₂ emissions due to the use of electric transport), the economic impact for users

of various mobility models, and the amount of investment required for project implementation has been conducted.

5. Correlation analysis – to test the hypothesis regarding the increase in the proportion of car-sharing users among the global population, Pearson correlation coefficient has been used. It has revealed a strong positive relationship between the absolute and relative growth in the number of users of such services.

6. Methods of logical analysis and deduction have been applied in formulating hypotheses, substantiating conclusions, and interpreting the empirical results of the research in the context of the sustainable development of rural areas in Ukraine.

Thus, the combination of qualitative and quantitative research methods ensured the comprehensiveness of the analysis of shared transport as a tool for the circular transformation of the economy and allowed for verifiable conclusions regarding its effectiveness in the context of a rural community.

7.2 The SE model in the context of circular transformation

CE is essential for achieving the SDGs in the agricultural sector. Integrating innovative methods and technologies that minimize the consumption of limited resources, encourage their replacement with renewable ones, prevent waste, and promote reuse and recycling is possible. Systematic implementation of such approaches enables a qualitative shift from focusing on production efficiency to prioritizing resource use efficiency.

Blockchain technology facilitates the introduction of the CE principles in the agricultural sector. It helps optimize forming "production-consumption" chains to enhance resource use efficiency [1].

Organic farming is one of the key directions for implementing the CE principles. Traditionally, farming enterprises predominantly apply organic agriculture.

Society increasingly recognizes that the depletion of natural resources, the deterioration of ecosystems, and the formation of harmful substances, including waste, pollutants, and greenhouse gas emissions, are directly caused by the dominant production and consumption paradigms. In particular, a significant impact on biodiversity loss, accounting for up to 90% of global indicators, is associated with the extraction and processing of primary raw materials [2]. In response to these challenges, there is a growing interest in CE as an alternative to the linear model.

At the same time, in practice, implementing circular approaches in various sectors, including agriculture, is accompanied by significant challenges, highlighting the need to search for adaptive models capable of functioning under limited resources, inadequate infrastructure, and changing consumer behavior.

Despite broad support at the conceptual level, implementing the CE principles faces considerable difficulties in practice. This concept often remains largely theoretical without proper scaling of implementation.

According to the Circularity Gap Report 2024, the share of circularity in the global economy decreased to 7.2% in 2023 [3, 4], compared to 8.6% in 2020 and 9.1% in 2018 [5]. It underscores that despite the growing interest in CE, its practical implementation is still not progressing quickly enough to overcome the overall negative trend.

Researchers note that there are various obstacles to CE implementing, including the need for greater financial support from governments, difficulties in creating effective circular supply chains, economic challenges related to consumer behavior, and challenges in product redesign. Significant investments in technology and infrastructure to support recycling, recovery, and reverse logistics are also crucial aspects. In this context, a critical model of CE that does not require substantial funds for implementation and positively impacts society's perception of the CE philosophy is SE.

The term "sharing economy" is increasingly encountered in international scientific literature. Numerous studies confirm a close relationship between the sharing and circular economies. This interrelationship is primarily determined by sharing, supporting the CE principles, and promoting more sustainable and rational consumption. The objective prerequisites for implementing the "sharing" concept are consumers' established perception of it and the presence of business entities that intend to and enforce such business initiatives [6].

The term "sharing economy" was introduced in 1978 by M. Felson and J. L. Spaeth [7]. It gained its popularity in the early 21st century and is associated with the name of L. Lessig [8, 9]. This scholar was one of the first to use this term in a modern context within professional literature.

Depending on the context, "sharing" can mean "to divide": as in splitting into equal parts; as distribution; as a form of collective ownership; as a process of communication; or as a form of individual embodiment in the network [10]. In English-language works, this term continuously shifts in meaning, which is linked to SE development and the dissemination of information regarding opportunities to participate in it on social media. Despite the lack of a direct connection between the terms "shared use" and "economy", the term "sharing economy" is commonly used and describes "a growing model of consumer behavior".

The practical implementation of the SE principles and models potentially provides both economic and social as well as environmental effects:

- it promotes savings and/or forms the basis of business;
- it alters consumer behavior;

- it reduces resource usage;
- it encourages more sustainable consumption and sustainable economic growth.

The interpretation of the term "sharing economy" is ambiguous. The practical implementation of the SE principles also involves various consumer practices and organizational models. The scientific literature presents different approaches to their distinction within SE according to the fields of scientific research (**Table 7.1**).

Table 7.1 Approaches to interpreting the term "sharing economy" and its organizational models

Author (source)	Explanation and typical features
M. Trigkas, G. Karagouni, M. Tsitsoni (2025) [6]	Part of the circular economy, based on creating value through common and open resources in ways that balance personal interests with the welfare of the broader community
P. Chen, Y. Wu, Z. Chu (2025) [11]	The use and exchange of unused resources or services through online platforms supported by the Internet and digital technologies, thereby achieving mutual utilization and shared access to resources and services
Y. Feng, R. Xu (2025) [12]	The product of the digital revolution, developing alongside the Internet
T. Surmacz et al. (2024) [13]	The internet is a central medium of communication and sharing with others, providing effective access to underutilized products
A. A. Singh (2022) [14]	The socio-economic structure in which people are willing to share their own "social" products and services, focusing on both the social and economic components of the concept
Z. Wu, W. Zhou, A. Yu (2023) [15]	Its mechanism is collaboration, which enhances the overall efficiency and reliability of the system
A. Sundararajan (2017) [16]	Economic and business model: one in which people have free access to resources, such as goods or services, through rental, exchange, leasing, or sale; which encourages maximum utilization of resources, often leading to savings and waste reduction
A. I. Szymańska (2021) [17]	This is an alternative model of consumption that is based on access to goods without the necessity of owning them

Source: created on the basis of [6, 11-17]

SE is related to both CE and the SDGs direct implementation. Many interpretations emphasize the peculiarities of ownership relations in implementing the SE principles. It includes the dispersion of such owner powers as the right to possess and use, restrictions on ownership rights, and the transfer to users of usage rights (leasing). The legal aspects exhibit significant differences depending on the qualitative characteristics of a SE model, whether commercial or non-commercial.

SE replaces ownership with access, promoting sustainable development by optimizing consumption and utilising resources that harm the environment. The shared

use of resources and services reduces the consumption of raw materials and energy, a decrease in emissions and waste disposal costs, thus minimizing the negative impact on the environment.

An important aspect is the direct connection between SE and the digitalization processes, and the presence of relevant digital platforms.

SE contributes to the CE goals and principles. Theoretically, reuse based on the application of shared access is one of the least resource, information-intensive, and labor-intensive ways to enhance product consumption efficiency. Thus, sharing products (services) embodies the principle of reuse within CE and underpins several other goals, such as management instead of ownership and resource use efficiency. There is a wide range of sharing practices and business models in practice.

The study of digital sharing platforms within CE context is just beginning to develop. Despite a broad spectrum of business initiatives implementing sharing practices that have emerged recently, the existing literature primarily focuses on the accommodation and mobility sectors, with prominent examples including Airbnb and Uber. However, many scholars hypothesize about why people contribute to SE, whether as consumers and/or providers of goods and services.

The SE interpretation and its expected effects by scholars is ambiguous. Given the diversity of various forms of digital exchange platforms and the conflicting assessments of what these practices contribute, researchers raise questions about the reality of providers' aspirations towards environmental, social, and the CE economic goals and principles, as well as the structuring of business models accordingly.

Let's consider digitalization processes to be a prerequisite for SE developing. Currently, most scholarly papers dedicated to SE examine the issue of the experience of implementing SE models in cities within the context of enhancing quality of life and sustainable urban economic development. SE primarily develops in urban areas due to high population density and the intensity of social interactions, which create favorable conditions for startups in this field. The spread of SE business models to rural areas is limited by lower population density and a lower concentration of unused assets. However, there is significant potential for developing SE in rural areas. In our opinion, its implementation is hindered in Ukraine by a low level of business culture and digitalization in the countryside.

The global SE market was valued at 261,3 billion USD in 2024 and is projected to reach 3181,21 billion USD by 2033, growing at an average rate of 32.01% per year. According to another forecast (the global market for SE was valued at a 260,36 billion USD in 2024), it will steadily grow and reach 3185,37 billion USD by 2033, maintaining an average annual growth rate of 32.08% from 2025 to 2033 [18].

The lack of information at the national level complicates the ability to assess the size of SE market in Ukraine. However, an analysis of the available data and trends indicates active development of various sharing models that are becoming increasingly popular among the population of Ukraine. The main segments characterized by significant growth dynamics include:

- transport services, particularly car sharing models;
- the short-term rental housing market, including peer-to-peer platforms;
- spaces for collaborative work, known as co-working centers.

SE is viewed as a crucial factor for Ukraine's economic development and the enhancement of its competitiveness. For the successful development of this sector, a favorable legislative environment and an advanced digital infrastructure are necessary.

Kyiv ranks among the top ten cities by the SE development index. Co-living spaces are actively developing in Kyiv and are becoming increasingly popular. The founder of the co-living network Vilnyy believes that within 5 to 10 years, co-living will become very widespread in Ukraine. Given the need to provide housing for those affected by the war, who have suffered destruction and require relocation, as well as the overall increase in demand for flexible and affordable living options, it can be argued that SE, particularly co-living, has significant potential for growth in Ukraine in the coming years. It is especially relevant for rural areas, where, despite a considerable number of registered internally displaced persons around 20% of the total IDP population, which as of March 2025 exceeds 4,6 million, there is often a lack of shelters.

In theory and practice, there is a gap between the general access to goods and services in SE. It is related to the dependency of access and the level of positive perception of SE on income, education, age, etc. Furthermore, a firm reliance on information and communication technologies implies that factors such as the availability of electronic devices, internet connectivity, and digital literacy can create barriers to online exchange platforms, particularly relevant for rural areas in Ukraine.

Currently, sustainable rural development cannot be considered in isolation from digitization. For instance, "ICT4D" - "digital-for-development" is widely used today. Although the term "ICT4D" was first mentioned in the 1960s, contemporary scholars point to a new phase in their development characterized by such dynamic and profound transformation that it warrants discussion of a radical change in the role of digital technologies and the emergence of a new paradigm of "digital-for-development".

Today, "ICT4D" is the most critical component of rural development: information and communication technologies (ICT) have nearly complete geographical and demographic coverage; they are used in all areas of human life (in households; in data collection and processing in business; in the decision-making process; directly

in agricultural production, etc.). These technologies are crucial for SE development. It implies access to technology and the possession of technological literacy by all members of society, which is currently problematic for Ukraine. The issue also extends to the existence of the digital divide, which is calculated as the difference (ratio) between the access opportunities of different individuals to the internet and digital technologies. Technological and social factors typically determine the causes of the digital divide. They are driven mainly by insufficient access to ICT and a lack of digital skills, the development of which is one of the most essential elements for future full and active participation in social life. According to the International Telecommunication Union (ITU) "Facts and Figures 2023", the steady but uneven progress in global internet connectivity highlights the presence of a digital divide [19]. For instance, in 2023, 81% of urban residents worldwide had internet access, whereas in rural areas this figure was only 50% of the population; respectively, in 2024, these figures are projected to be 83% and 48%. The gap between urban and rural areas, measured as the ratio of these two percentages, has remained stable in recent years: 1.7 in 2020, 1.6 in 2023, and 1.7 in 2024.

A problem for rural areas and the agricultural sector is the low level of digital literacy among the population. According to a sample survey, 61% of interviewed leaders of farming enterprises acknowledge the insufficient level of digital maturity of their operations and critically assess the level of digital competencies as personal and among employees [20].

The digital divide is observed between rural and urban residents and employees of agricultural holdings and other economic entities. Unlike large agricultural formations, Ukrainian smallholders focus on the domestic market, which means they currently ensure the country's food security and improve living standards in rural areas. Small agricultural enterprises represent a model of village-preserving business practice and are fundamental to the comprehensive sustainable development of rural territories and the maintenance of rural settlement networks. However, agricultural producers who adhere to this model face significant challenges related to material and technical support, staffing, increased production costs, and the lack of sales markets. The prospects for solving these problems are connected, among other things, to implementing a SE model. For instance, the shared use of equipment, including drones, and establishing infrastructure based on cooperation (supply-storage-processing) are also in line with the SE principles. The implementation of the SE model is directly conditioned by the development of digital competencies among members of farming households, owners, and agribusiness employees within "the learning region" concept framework. Accordingly, let's view the development of digital competencies as both a prerequisite for the effective implementation of

"the learning region" concept and as a tool for the competitiveness of small agribusinesses, which is particularly relevant in the context of revitalizing business and ensuring sustainable rural development in the post-war period. Furthermore, the development of digital competencies is a prerequisite for the practical realization of the lifelong learning concept [21] (which pertains to economic literacy, the ability to utilize digital platforms, and positive perception and engagement with the SE model) and for ensuring the preservation and development of small agricultural producers.

Let's align ourselves with the position of researchers regarding the priority of developing individual, family, and small to medium-sized agricultural enterprises as the foundation for ensuring sustainable rural development and the preservation of the settlement network. In this context, researchers identify the need to direct agricultural policy towards stimulating the entrepreneurial potential of landowners, which is impossible without the formation of digital competencies. It entails the partnership involvement of the state, business, civil society (especially local communities), and educational institutions (of all levels), particularly in the context of SE establishment. It relates to the social transformation in rural areas.

The issues of sustainable rural development in European countries are similar to those within the country (migration, urbanization, etc.). However, in Ukraine, these problems are more profound and are exacerbated by the ongoing military actions. Most researchers see the resolution of these issues and the source of rural development in social innovations. Many foreign scholars often link studies aimed at forming an optimal rural development model to local and extra local networks. Regarding local networks, the cooperation of local communities with entities such as local business representatives, non-governmental organizations, and educational institutions is considered. This cooperation is explicitly organized to ensure sustainable rural development. The SE model aligns with these targeted directions.

It is traditional for researchers to argue for the necessity of implementing a model of innovative development that involves collaboration between business, government, education, and the community of local territorial society ("quadruple helix"). This model has proven successful in emerging and disseminating social innovations aimed at sustainable rural development and can be used as a foundation for implementing the SE principles.

Digitization is a fundamental prerequisite for SE development. Despite the global growth of this direction, its spread in Ukraine, particularly in rural areas, is hindered by the digital divide and a low level of digital literacy. At the same time, SE has significant potential to support small agricultural businesses and address socio-economic issues. One promising area of SE in rural areas is the shared use of transport, which provides environmental, economic, and social benefits.

7.3 The programme for shared transport use in rural areas: environmental, social and economic effects

The most widespread model of SE in the world at present is shared mobility services, such as car sharing, bike sharing, and electric scooter rentals. However, experts emphasize that most companies providing such services cease their operations within five years or earlier. This fact contradicts the need to reduce emissions, with expectations for achieving these goals directly linked to mobility. Shared mobility involves replacing transport ownership with the opportunity to utilize shared resources as needed. In the context of Ukraine's Euro-integration and the need to implement the "Smart and Sustainable Mobility" strategy, it is fitting to examine the positive experiences and challenges faced abroad, assess the state and prospects for the development of shared mobility services, and identify ways to implement them in Ukraine.

Car sharing is an effective tool for ensuring sustainable urban mobility. Evidence shows that its usage contributes to a decrease in the number of private vehicle owners and users, reducing greenhouse gas emissions. It accounts for the steady growth in car-sharing users worldwide. It is predicted that in 2029 their numbers will exceed 68 million individuals [22]. However, these are absolute figures: while the number of car-sharing users is increasing, so is the population. **Table 7.2** and **Fig. 7.1** provide the dynamics of the share of car-sharing users globally.

Table 7.2 The number of car-sharing users worldwide from 2017 to 2023, with a forecast up to 2029

Years	Number of users in millions	World population in billions of people	%
2017	36,04	7,646	0.47
2018	38,55	7,73	0.50
2019	41,6	7,811	0.53
2020	44,69	7,887	0.57
2021	47,91	7,954	0.60
2022	50,33	8,021	0.63
2023	54,89	8,092	0.68
2024	57,06	8,162	0.70
2025	59,31	8,232	0.72
2026	61,49	8,301	0.74
2027	63,68	8,369	0.76
2028	65,92	8,437	0.78
2029	68,19	8,503	0.80

Source: developed by the authors based on [22, 23]

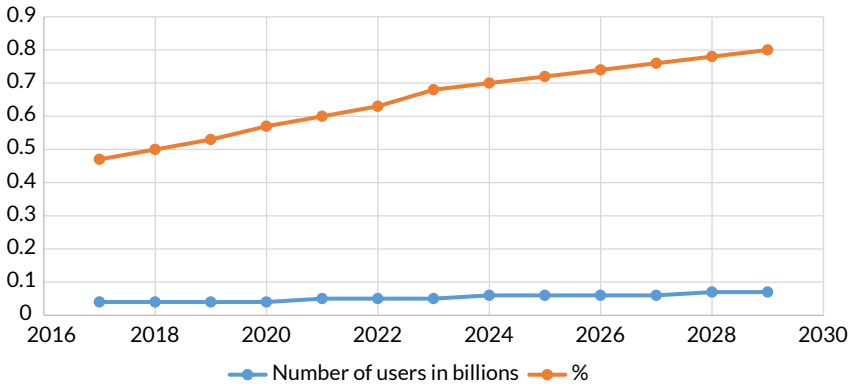


Fig. 7.1 The number of car-sharing users worldwide from 2017 to 2023, with a forecast to 2029
 Source: developed by the authors based on [22, 23]

The data in **Table 7.2** and **Fig. 7.1** indicate a stable increase in car-sharing users. However, the percentage of such users remains relatively low.

To quantitatively assess the relationship between the number of car-sharing users worldwide and their prevalence among the global population, it is possible to conduct a correlation analysis of actual data from 2017 to 2023 [22, 23]. To determine the strength and direction of the linear relationship between these two indicators, Pearson correlation coefficient (r) was calculated using the formula

$$r = \frac{\sum[(x_i - \bar{x})(y_i - \bar{y})]}{\sqrt{[\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2]}}$$

where x_i – the number of car-sharing users in millions; \bar{x} – the average number of users ($\approx 44,86$ million); y_i – the percentage of users relative to the world population; \bar{y} – the average percentage of users ($\approx 0.569\%$).

The calculations based on the actual data from the table showed the following sums

$$\sum[(x_i - \bar{x})(y_i - \bar{y})] \approx 2.976, \sum(x_i - \bar{x})^2 \approx 268.1, \sum(y_i - \bar{y})^2 \approx 0.033.$$

Substituting these values into the formula gives

$$r = \frac{2.976}{\sqrt{268.1 \cdot 0.033}}, r = \frac{2.976}{\sqrt{8.8473}}, r = \frac{2.976}{2.974}, r \approx 0.999.$$

The obtained correlation coefficient is 0.999. This value is extraordinarily high and approaches 1, indicating a virtually perfect linear relationship between the number of car-sharing users worldwide and the percentage of the global population that uses these services. In other words, during the analyzed period, each significant increase in the total number of people using car-sharing has been accompanied by a proportional rise in the share of these users within the overall structure of the global population. It confirms a stable and pronounced trend of increasing popularity of car sharing globally, alongside the Earth's population growth. Thus, it can be asserted that car sharing not only attracts new users in absolute terms but also becomes an increasingly prevalent mode of transport relative to the total number of people on the planet.

It should be noted that car sharing and car rental are fundamentally different in terms of service provision principles. Both services allow users to access a vehicle that is not privately owned, while maintaining a high level of interpersonal anonymity. However, car sharing differs from car rental in that it is carried out using digital technologies, is more flexible in terms of access, and, therefore, differs in more flexible access modes and pricing strategies.

Today, the five main business models of car sharing are identified (Fig. 7.2).

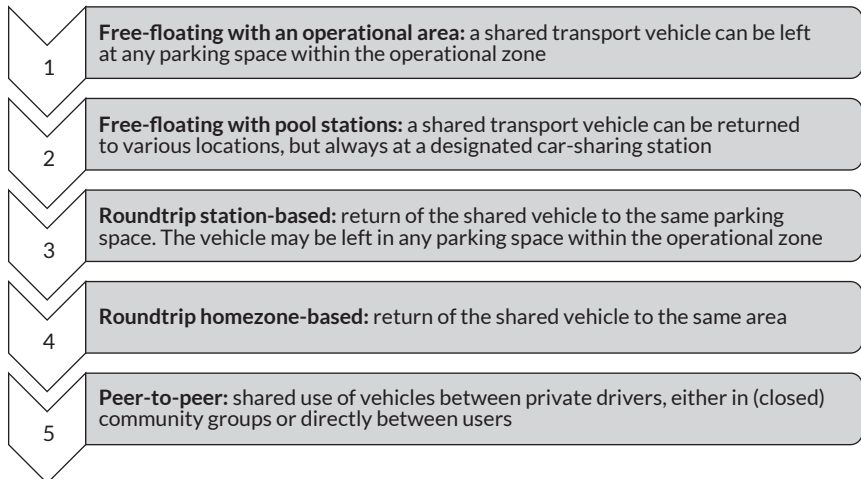


Fig. 7.2 Main business models of car sharing
Source: developed by the authors based on [24]

Today, car sharing is generally seen as a tool for reducing traffic congestion, decreasing the demand for parking spaces, and freeing up street space for active mobility

in cities and as an essential element of sustainable urban development. However, car sharing implementation in rural areas is less developed and has particularities. Rural areas are characterized by low population density and significant distances between public facilities such as schools, shops, and medical establishments. These characteristics complicate the provision of public transport services at a level that would be satisfactory for rural residents and economically viable. As a result, rural residents without their vehicles often encounter difficulties with mobility and access to essential social services. In other words, the overall effectiveness of transport systems in rural areas usually fails to provide all rural residents with adequate accessibility, leading to social isolation.

Today, the implementation of car sharing in Ukraine occurs in the context of large-scale military actions, which impact all areas of life, including the mobility of the population. Those territories of Ukraine that are not in areas of active combat have become a refuge for a significant number of internally displaced persons, leading to increased pressure on the existing transport infrastructure. Concurrently, activating the volunteer movement to assist the military, displaced individuals, and the civilian population is creating new mobility needs. Under such conditions, the car-sharing concept may hold particular significance, providing a flexible and accessible solution for the transportation of residents and internally displaced persons and meeting the transport needs of volunteer initiatives. However, there are significant security, economic stability, and logistics challenges. Considering these specific features, namely the impact of migration processes, volunteer activities, and general instability, it is possible to choose the settlement of Adzhamka in the Kirovohrad region for analysis. The research in this locality may reveal specific needs and potential for implementing shared transport models in rural areas that align with the conditions of wartime and post-war recovery in Ukraine.

Adzhamka is a rural community with a population of over 6,000 people, of which approximately 1,800 constitute the economically active population. A distinctive feature of the community is the reception of a significant number of internally displaced persons, the number of which exceeded 300 as of July 2025. An active labor migration of a considerable part of the working-age population to the regional center, Kropyvnytskyi, indicates a need to establish transport connections. Thanks to its natural and historical resources, the community possesses certain tourist potential, which creates the conditions for developing green and ethnographic tourism. The area of the community is substantial (292,0 km²), and the settlements are dispersed, emphasizing the importance of ensuring mobility for residents. The level of digitalization in the community is assessed as average, which necessitates consideration of the needs of users with basic technology skills when developing digital solutions, such as interfaces for shared transport.

In developing and implementing the car sharing programmed in Adzhamka, it is possible to utilize the experience of car sharing in rural Sweden. Firstly, let's consider that electric vehicles are increasingly viewed as a promising solution for car sharing in rural areas, contributing to environmental sustainability. Furthermore, unlike cities with developed public transport systems, car sharing in rural areas will also serve as a primary alternative to private cars, particularly for those with limited access to personal transport. Innovative approaches are often required to successfully implement transport sharing in rural areas, such as localized, community-oriented service models that address the specific needs of residents. Accordingly, to begin with, the fleet will consist of 4 electric cars and 15 electric bicycles.

The public transport sharing programme in Adzhamka is a multifaceted initiative aimed at improving residents' mobility, supporting the community's economic activity, and addressing important social and environmental issues. The implementation of this model, which combines the use of electric vehicles and electric bicycles, aligns with current trends in sustainable development and offers an alternative to traditional modes of transport. By integrating electric vehicles and electric bikes, the programme responds to global trends in sustainable development, providing a modern alternative to conventional forms of transport.

At the initial stage of implementation, the programme requires an investment of 2,600,000 UAH, of which 2,000,000 UAH will be allocated for purchasing four electric vehicles and 600,000 UAH for acquiring fifteen electric bicycles. Thanks to the chosen cooperative funding model, which incorporates initial and annual contributions from the cooperative members, payment for the use of electric vehicles (30 UAH/hour for cooperative members and 50 UAH/hour for all others) and electric bicycles (10 UAH/hour and 30 UAH/hour respectively), as well as sponsorship contributions from business entities in the Adzhamka community, the programme is financially sustainable. The car sharing programme entails the creation of a cooperative with a "Roundtrip station-based" model, to be funded through initial and annual contributions from members (2,000 UAH and 1,200 UAH, respectively), sponsorship support (200,000 UAH per year), and rental fees for members (30 UAH/hour for cars, 10 UAH/hour for bicycles) and non-members, including tourists (50 UAH/hour for bicycles). Modern digital platforms, such as GoGet Carshare or RENTHUB, are advisable for managing the service.

The social significance of the programme lies in ensuring transport accessibility for a wide range of residents, including internally displaced persons, facilitating their integration and easing access to employment, medical facilities, shops, and other essential services in the regional center. Furthermore, the development of green tourism and internal mobility within the community is actively supported by

the availability of electric bicycles at an affordable price for cooperative members and the ability for tourists to rent them, which serves as an additional source of income.

From an environmental perspective, the programme contributes significantly to reducing harmful emissions into the atmosphere, decreasing noise pollution, and promoting responsible resource consumption. Recognizing the limitations of the initial fleet to meet the needs of all 1200 cooperative members, a strategic direction for development is the gradual expansion of the number of available vehicles, which requires time and effective financial planning, supported, in particular, by income from vehicle rentals by cooperative members and tourist bicycle rentals, to achieve an optimal level of service and ensure the long-term stability of the programme. Furthermore, assistance from the Adzhamka rural territorial community is also appropriate.

Considering the need to ensure convenience for all members of the cooperative, particularly elderly individuals, it is advisable to utilize the digital platform GoGet Car-share, which website emphasizes the service's ease of use for older people, and RENT-HUB, which is notable for offering various booking methods, including direct contact, which may be convenient for users who find it difficult to use mobile applications.

Introducing the car sharing programme will help reduce carbon dioxide emissions. Four electric vehicles operated by the cooperative travel approximately 144,000 kilometers per year (3,000 km per month each), while the average CO₂ emission figure for new passenger cars in Ukraine stands at 95 grams per kilometer. To determine how much emissions have been prevented thanks to the use of electric vehicles, it is possible to multiply the total annual mileage by the average emissions figure for petrol cars: 144,000 km multiplied by 95 g/km equals 13,680,000 grams of CO₂ (13.680 kilograms of CO₂ or 13.68 tons of CO₂). Electric vehicles do not produce direct carbon dioxide emissions during their operation. Therefore, using electric vehicles instead of internal combustion engine cars reduces the amount of harmful emissions in the atmosphere by this amount. It is important to note that CO₂ emissions may be related to electricity production, but are significantly lower than direct emissions from petrol cars. Reducing CO₂ emissions by 13.68 tons per year is crucial for improving the environmental situation in Adzhamka and beyond, as carbon dioxide is one of the leading greenhouse gases contributing to climate change. Reducing its emissions helps to slow the global warming process, lowers the risks of extreme weather events, and improves air quality for the local community. Thus, the car-sharing programme not only provides convenient and accessible transport for residents but also makes a significant contribution to environmental preservation.

There is a sufficiently high economic effect from implementing the transport sharing programme for cooperative members compared to owning a personal car and travelling by bus for residents of Adzhamka who work in Kropyvnytskyi.

For a resident who travels daily (5 days a week) to work in Kropyvnytskyi in their car, this saving may exceed 20,000 UAH per year, whereas using the bus could save more than 30000 UAH (Table 7.3).

Table 7.3 Calculation of the economic effect from the implementation of the koshering programme in Adzhamka for co-operative members (per year)*

No.	Traditional method of transport	Koshering	Economic Effect
1	Main expenses when using a personal car. Fuel: 230 UAH (114.66 UAH one way). For five working days a week, this will amount to 1,150 UAH, and for a year (approximately 52 working weeks) – 59,800 UAH	Electric vehicle: Rental cost: 30 UAH/hour. The average total rental time for a trip is 4 hours. Cost per day: $30 \cdot 4 = 120$ UAH. Cost per week (5 days): $120 \text{ UAH} \cdot 5 = 600$ UAH. Cost per year: $600 \text{ UAH} \cdot 52 = 31,200$ UAH. Plus annual membership fee: 1,200 UAH. The total cost of using the electric vehicle car sharing per year is 32,400 UAH	For the car owner. In the case of using an electric vehicle: 59,800 UAH – 32,400 UAH = 27,400 UAH. In the case of using an electric bicycle: 59,800 UAH – 16,800 UAH = 43,000 UAH
2	The cost of travel both ways (average value 78 UAH + 110 UAH = 188 UAH / 2 = 94 UAH one way): 94 UAH · 2 = 188 UAH per day. For five working days a week: 188 UAH · 5 = 940 UAH; for a year (52 weeks): 940 UAH · 52 = 48,880 UAH	Electric bicycle: Rental cost: 10 UAH/hour. The average round-trip time is 6 hours. Daily cost: 10 UAH · 6 = 60 UAH. Weekly cost (5 days): 60 UAH · 5 = 300 UAH. Annual cost: 300 UAH · 52 = 15,600 UAH. Plus annual membership fee: 1,200 UAH. The annual cost of using the electric bicycle from car-sharing is 16,800 UAH	Instead of public transport: 48,880 UAH – 16,800 UAH = 32,080 UAH

Note: * the distance from Adzhamka to Kropyvnytskyi is approximately 24 km.

Source: calculated by the authors

The car-sharing programme in Adzhamka has significant economic potential for residents who regularly travel to Kropyvnytskyi, especially compared to the costs of maintaining a private vehicle. Even compared to using a bus, car sharing may be a more advantageous option for cooperative members, particularly considering the convenience and flexibility of using their transport. Implementing this programme will enhance mobility, ensure access to services, and support volunteering, economically stimulating local activity and savings for residents, while reducing emissions and noise pollution. An expansion of the fleet is planned through profits and investments. The car sharing programme holds substantial potential for community development, providing a modern, accessible, and environmentally friendly mode of

transport, thus contributing to its social and economic prosperity. Additional aspects include social benefits for various population groups, stimulation of the local economy, environmental responsibility, development of charging station infrastructure, scalability, and the importance of interaction with local authorities.

7.4 Conclusions

The results of the conducted research have confirmed that models of shared transport can serve as an effective tool for implementing the CE principles at a local level. Sharing models not only ensures optimal use of material resources but also contributes to the formation of a new culture of consumption that aligns with the SDGs, specifically Goals 11 (sustainable cities and communities), 12 (responsible consumption and production), and 13 (combating climate change).

Calculations made using the example of the Adzhamka territorial community have confirmed the feasibility of implementing local shared transport programmes in rural areas, provided there is an adequate level of digital accessibility, organizational support, and cooperative management. The calculations of the environmental effect have demonstrated the potential for reducing CO₂ emissions by over 13 tons per year. At the same time, the economic assessment indicated possible annual savings ranging from 27,000 to 43,000 UAH for each user compared to alternative mobility options. The social significance of the initiative is manifested in the increased mobility of vulnerable population groups, including internally displaced persons, and in promoting the development of the green economy and rural tourism.

The results indicate that the hypotheses in the study can be considered confirmed. In particular, hypothesis H₁ regarding the potential for shared transport as an effective tool for implementing the CE principles is supported by the identified ecological, economic, and social effects. Hypothesis H₂ concerning the critical role of digital competencies and infrastructure has also been validated in the context of the Adzhamka territorial community, where the level of digital readiness significantly influences the ability to participate in the programme. Hypothesis H₃ regarding the viability of the cooperative management model has proven justified from both financial and organizational perspectives, contingent upon the involvement of local stakeholders and support from the community.

At the same time, the research findings confirm the limited scalability of such models without considering the local context. In particular, key barriers include uneven access to digital infrastructure, low levels of digital literacy in rural areas, limited community participation in decision-making, and weak institutional support. It is consistent with

the conclusions of earlier studies, which emphasized the dependency of SE effectiveness on social capital, digital competencies, and technological integration levels [25].

The sustainability of shared mobility models remains a contentious issue in the long term, particularly in conditions of economic instability or institutional uncertainty. As international cases demonstrate, car sharing often proves economically vulnerable and has a high rate of company operational cessation. Consequently, an important area for further research is the examination of the financial viability of such models under cooperative or public-private management forms, as well as the development of sustainability indicators for local SE initiatives.

Future research should be focused on several directions. Firstly, it is essential to deepen the empirical foundation by studying other rural communities with varying socio-economic development levels to identify the determinants of successful sharing models. Secondly, conducting sociological research on the perception of shared mobility among different population groups is pertinent, particularly considering age, income, education level, and digital literacy. Thirdly, analyzing the possibilities of integrating "smart mobility" elements and renewable energy sources within shared transport programmes appears promising. A specific research vector should be directed towards assessing the impact of car sharing on employment, entrepreneurship development, and social cohesion in post-war rural communities.

Thus, the proposed calculation of economic feasibility allows not only for the assessment of the current potential of SE as a CE tool but also lays the groundwork for the development of new policies aimed at transforming consumption models, strengthening local economies, and achieving comprehensive sustainable development outcomes.

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