The Environmental Impact of Transportation in The Developing Tourism Sector

Ilaha Gurbanova
Department of Organization of The Tourism Industry
Azerbaijan Technological University
Ganja, Azerbaijan
ilahequrbanova01@gmail.com

***Abstract*— The role of transportation in tourism is undeniable, but also is the source of carbon emissions. In this thesis how transportation affect the environment is discussed, the purpose to research alternative ways is illuminated and the solution is suggested.**

Key words: Transportation, carbon emissions, environment

I. INTRODUCTION

Transportation is the one aspect of the tourism industry that tourists absolutely rely on. A report by Sustainable Travel International highlights that tourism contributes roughly 8% of the world's carbon emissions, with nearly half of that—around 49%—coming from transportation used in travel. In comparison, emissions from tourism-related goods represent about 12% of the total. So, each type of transportation affects the environment differently.

The Impact of Railway Transportation in Tourism on the Environment

During the late 20th and early 21st centuries, the use of railways for passenger and tourist travel declined due to increased competition from other transportation options. Environmentally, rail transport has a relatively minor impact, mainly limited to issues such as vibrations, the creation of man-made landforms like embankments and cuttings, and potential electrostatic or electrical pollution from electrified railway lines.

The Impact of Road Transportation in Tourism on the Environment

Road transport has significantly boosted the tourism sector by offering a variety of travel options, including buses, coaches, maxi-taxis, and most notably, private cars. Among these, cars are the most widely used and continue to grow in popularity for several key reasons:

- More freedom in selecting travel routes
- Tourists often aim to explore more within a limited time, which enhances travel comfort and, in some cases, helps cover longer distances efficiently
- Improved access to remote attractions and easier handling of luggage
- A stronger sense of autonomy and independence for travelers
- Lower travel costs per tourist, especially when the vehicle is used at or near full capacity

Regarding the relationship between these transport modes and the environment, it's crucial to acknowledge their significant and diverse environmental impacts. These include emissions of carbon monoxide (CO), sulfur oxides (SOx), nitrogen oxides (NOx), lead, polycyclic aromatic hydrocarbons (PAHs), and other volatile organic compounds. Additionally, they contribute to noise and soil pollution, require large amounts of land for infrastructure, and pose accident risks.

The Impact of Water Transportation on the Environment

In tourism, water transport is mainly used through cruise ships, which serve a dual purpose—providing both travel and accommodation, often making the vessel itself the main destination. These ships are attractive to tourists because they offer a wide range of amenities, including dining, shopping, sports activities, swimming pools, dancing, theaters, movies, conference facilities, and libraries, essentially functioning as floating resorts. Additionally, there is a growing popularity in the use of ferryboats, yachts, jet skis, hovercrafts (commonly in areas like Great Britain and Alaska), kayaks, canoes, and various types of boats, which often serve as both transportation and entertainment or tourist attractions in their own right.

For the environment, the effects of water-based transport are influenced by several factors, including the risk of accidents, the way tourists and tourism staff handle waste and materials on board, the environmental design and technical features of the vessels, and even diving schedules, which can potentially harm marine ecosystems.

The Impact of Air Transportation on the Environment

Air travel is among the most favored forms of transportation due to its short travel times, high level of comfort, and the convenience of online booking systems. Nevertheless, it does have some drawbacks, such as the perceived danger of accidents—despite global statistics confirming that air travel is one of the safest modes, equipped

with advanced security screening, skilled professionals, and cutting-edge aviation technology. Other limitations include the threat of terrorist attacks, fixed departure times, and generally high ticket prices.

From an environmental standpoint, air transport is a significant contributor to global warming and ozone layer depletion. Moreover, airports are major sources of air pollution, particularly in nearby residential zones, and also generate substantial noise pollution.

II. THE PROBLEM

The Contribution of Tourism and Its Transportation to Global Warming

Global warming refers to the rise in average temperatures near the Earth's surface and in the oceans. This phenomenon became a growing concern after the 1960s, coinciding with rapid industrialization and an increase in greenhouse gas concentrations, which are widely considered to be the primary cause of global warming.

In 2004, David King, then Chief Scientific Advisor to the British Government and a respected scientist, emphasized that climate change—a direct outcome of global warming—posed the most critical threat facing humanity, even more severe than terrorism.

The steady growth of international tourism, reaching hundreds of millions of trips annually, along with billions of domestic journeys, has significantly contributed to the intensification of the greenhouse effect. At the same time, the tourism industry is particularly vulnerable to the impacts of climate change.

A report by the UN World Tourism Organization (UNWTO) highlights the connection between tourism and climate change. The key findings of this study include:

- Carbon emissions resulting from transportation, lodging, and various tourism-related activities are estimated to account for 4–6% of global carbon dioxide emissions.
- In the absence of effective countermeasures, emissions from the tourism sector could potentially increase by 150% over the next three decades.
- The impact of climate change on tourism is expected to grow alongside the intensifying greenhouse effect. Destinations where climate plays a key role—such as Northern Europe, the Mediterranean, and the Caribbean—are especially at risk.
- Coastal regions, mountain areas, and remote natural environments in developing nations and on small islands are likely to be among the most severely affected.
- The tourism industry must adapt to these changes, particularly in high-risk regions, by significantly reducing emissions through the adoption of cleaner technologies and the implementation of financial strategies to support sustainable practices.

As a result, the tourism industry plays a role in global warming primarily through the carbon dioxide emissions generated by airplanes and cars. These modes of transport not only carry tourists to their destinations but also deliver the goods and services required to meet their needs during their stay [1].

Transportation and Its Environmental Impact

Based on data from the Belgian transportation platform De Lijn, the amount of CO_2 emitted per kilometer (0.62 miles) varies depending on the mode of transport:

- Train: 28g CO_2/km
- Bus: 75g CO_2/km
- Hybrid Bus: 60g CO_2/km
- Private Car: 100g CO_2/km
- Scooter: 77g CO_2/km
- Walking/Biking: 0g CO_2/km

To determine the average carbon dioxide emission per transport unit, one can divide the CO_2 output by the number of passengers and distance traveled (person-kilometer), which reflects the emissions per person over one kilometer.

Public transport produces significantly less CO_2 compared to private vehicles. Therefore, choosing buses, trains, or similar shared options over driving alone can substantially reduce environmental impact. When available, using bike-sharing services is another eco-friendly travel choice that helps minimize one’s carbon footprint.

III. THE PURPOSE

What is Sustainable Transportation?

Sustainable transportation refers to a system that fulfills three key principles:

- **Environmental Protection:** It aims to lower greenhouse gas emissions and safeguard natural ecosystems. This involves the use of renewable energy sources, the development of environmentally friendly infrastructure, and promoting alternatives such as walking, cycling, and public transit.
- **Economic Efficiency:** It focuses on keeping transportation costs affordable for all, reducing the financial strain on users. By doing so, it encourages broader public involvement in using and supporting sustainable transport systems.
- **Social Inclusion:** It ensures travel options are safe and accessible for everyone, including vulnerable and marginalized groups. This allows all individuals to participate fully in social and economic life.
- **Why Is Sustainable Transportation Important in Tourism?**
- Sustainable transportation plays a vital role in tourism by positively impacting environmental, economic, and social factors.

- **Protecting Tourist Destinations**. Sustainable transportation helps minimize pollution and adverse effects at tourist sites, particularly in ecologically sensitive areas. By reducing vehicle emissions and noise, it helps preserve the surrounding environment, maintaining the natural beauty and health of ecosystems. This contributes to sustainable and high-quality travel experiences while safeguarding destinations for future generations.
- **Creating Unique Travel Experiences**. Using sustainable transportation allows tourists to explore destinations at a more relaxed and immersive pace. Walking or cycling provides more time to appreciate the scenery, while electric vehicles, compared to traditional gas-powered ones, produce less noise, contributing to a more serene atmosphere.
- **Reducing Travel Costs**. Transportation expenses are often a significant portion of travel costs, especially for long trips involving air travel. Sustainable transportation options, such as fuel-efficient vehicles or public transit, can help lower these costs, easing the financial burden on tourists. This approach can also make the travel experience more unique and memorable. While international travelers may be limited to air travel, domestic travelers who have more time can consider alternative modes of transportation, which can also help create a greener system.
- **Aligning with Tourist Preferences**. According to the World Economic Forum, 76% of travelers plan to participate in sustainable travel in the future, and around 43% are willing to pay more for eco-friendly options. Over 40% of tourists intend to take trips where walking, cycling, or using local public transport is possible. Therefore, sustainable transportation aligns with the increasing demand for responsible and environmentally conscious travel.
- **Supporting Local Economies**. The promotion of sustainable transportation not only enhances the travel experience but also supports local economic growth. It stimulates tourism and creates job opportunities within local transportation networks, thus positively contributing to the economic development of the area [2].

IV. THE SOLUTION

Unique and Eco-Friendly Transportation. An app called *Miles*, created by an American startup, rewards users with points for being active. These points can be redeemed for online shopping or coffee shop discounts. What makes this service unique is that the points earned vary based on the mode of transportation. For instance, walking earns you ten times more points than driving a car, while taking a train, bus, or boat provides slightly more points than driving. This app is currently available in the United States, and the concept of earning points through eco-friendly transportation is starting to gain traction in Europe as well. It's a win-win scenario for both the environment and users, offering an easy way for individuals to make greener transportation choices.

In Japan, there are **apps** that reward users with points based on the number of steps they take. **Walking** is an environmentally friendly mode of transportation since it produces zero CO_2 emissions. There are many apps worldwide that motivate people to walk, ranging from game-like apps to those focused on fitness goals or even competitive walking challenges. It also allows tourists to fully appreciate their surroundings, offering a more authentic and immersive experience, while also reducing noise pollution for local communities. It's a win-win for both tourists and residents.

Using **public transportation**, such as electric buses or those powered by eco-friendly fuels like CNG, LNG, or electricity, helps reduce air pollution. These transport options tend to be more efficient and have a smaller environmental impact compared to cars. Public transport also helps alleviate traffic congestion and can save time for tourists.

Choose trains, buses, or electric vehicles for short trips instead of taking domestic flights. Domestic flights generally produce more CO_2 than buses. According to *Our World in Data*, the average domestic flight emits 246g CO_2e per kilometer per passenger, which is nearly three times higher than buses (97g), five times higher than electric vehicles (47g), and about eight times higher than trains (29g) or trams (35g).

Carefully planning your travel itinerary can help reduce unnecessary travel and save time. **Choosing accommodations near major attractions** cuts down on travel distances and minimizes vehicle use. Tourists can also avoid unnecessary routes and streamline their travel plans, ensuring a more convenient and enjoyable experience.

The use of shared electric kickboards, which has gained popularity in countries like those in Europe and the United States, is also considered a convenient and eco-friendly option for getting around.

Electric Vehicle (EV) Sharing Services. Cars typically emit more CO_2 than other forms of transportation. An alternative is using electric vehicles (EVs), which do not produce CO_2 or harmful exhaust emissions while driving. While it's true that EVs may not be entirely environmentally friendly due to emissions involved in their production and the energy used for charging, EV sharing services offer a potential solution.

EV sharing services are already widely available across Europe. The Volkswagen Group's EV-only car-sharing service, "We Share," is set to expand to seven European cities, starting with Berlin, Germany. If a traveler finds themselves in a city offering such services, it's recommended to take advantage of these environmentally friendly transportation options.

Electric Bike / Bicycle Sharing. In Tokyo, the popularity of bicycle sharing through Docomo Bike Sharing is on the rise. In New Zealand, electric motorcycles are being

shared to promote ecotourism. Motubikes, for example, offers electric bikes powered by solar energy to help tourists explore Great Barrier Island in a more sustainable manner.

Choosing the right mode of transportation is a personal decision, influenced by factors such as location, proximity, price, and personal preferences. When selecting transportation options, it's worth considering not only "cost and time" but also the "environmental impact" for those seeking a more eco-friendly travel experience.

Recently, bike-sharing services have become more widespread in cities and tourist destinations. There's also a growing trend to promote "ultra-compact mobility," which includes small vehicles that seat one or two people and offer excellent environmental performance. Additionally, "green slow mobility," such as electric vehicles that travel at speeds under 20 km/h, is gaining popularity for its convenience and eco-friendliness. It seems that more low-impact options will become available soon. With new services constantly emerging, it's a good idea to explore the eco-friendly choices in your area and see where the journey takes you next [3].

V. THE CONCLUSION

Given this situation, focusing on solutions to promote sustainable transportation not only helps protect the environment but also opens up new opportunities for tourism development. It’s the key to starting an eco-friendly travel journey. Remember every small step you take today contributes to the future of sustainable tourism.

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