

The role of green logistics in the sustainable development of the economy

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Introduction

In recent years, care for the environment has become a major concern for society. This search to improve our environmental footprint, with the aim of achieving sustainable economic growth, applies in particular to the logistics sector, with the development of green logistics.

More and more companies are trying to combat this growing concern by reducing the environmental impact of their supply chain. However, these changes often present companies with a challenge: How can I be more respectful of the environment without affecting my business?

"Green" logistics are any initiatives in the supply and storage of goods aimed at sustainable development. Its goal is to improve business processes and, most importantly, reduce the ecological footprint. Initiatives can be different - it all depends on the business and industry. Basically, companies try to emit less carbon dioxide into the atmosphere, use completely renewable energy, and also invest in projects that are aimed at reducing the greenhouse effect.

Key words: Supply Chain Management, **logistics**, **Green logistics**, Intelligent Transportation System (ITS), management of transport systems, automated control system.

1. Green logistics in the economy by sector

For businesses, green logistics is a move towards more environmentally friendly ways of doing business. Historically, logistics operations have focused on things like customers, sales, revenue, and financial security. However, traditional logistics procedures have never considered the environmental impact of their practices.

This used to be the case, but today, thanks to green logistics strategies, they have begun to change for the better. The idea of green logistics not only helps protect the environment, but also helps to increase corporate sales in the logistics sector.

When green logistics solutions are used effectively, there will be a clear symmetry between the economy and the environment. As a result, businesses are increasingly adopting greener logistics practices and adjusting their corporate stance on environmental issues.

The creation of green jobs and the development of relevant skills are often considered a priority for developed economies. There is an opinion that in low and middle income countries it is too early to think about this or it is such a luxury that these countries cannot afford due to their low budget and economic underdevelopment.

The green transition (greening of the economy) has a direct relationship with reducing poverty and creating more decent jobs. For example, it is known that poor people in developing countries cause more damage to the environment. A good example of this is Brazil's tax evasion: although exact data are not available due to the illegal nature of the activity in question, it is well known that local poor people are hired by companies for illegal logging activities.

These people engage in this activity because they do not have an alternative source of income. Thus, it is critically important for the state to offer them alternative ways of employment, which can be done through "green jobs": as a counterbalance to uncontrolled and unsustainable forest consumption, the state can create public employment projects aimed at environmental protection and rehabilitation (**Fig. 1**):



Fig. 1. "Green" logistics and sustainable use of energy for transport purposes

- **Water and waste management** - water and waste management is the leading sector in terms of creating green jobs. In developed economies, a significant change in jobs in the mentioned direction is expected: in particular, the traditional jobs in the mentioned field waste/used water and/or waste collection/recycling will be phased out. Instead, other types of activities appear - eg. Leakage identification, sanitation control/inspection, water flow measurement and consumer awareness on the mentioned issues. New professions such as waste prevention

managers and processing industry operators have emerged in local governments. Waste management does not mean only their recycling, but it is necessary to find out/analyze their composition. Thus, "green chemistry" becomes one of the leading fields in this direction. Consuming products made from cleaner and healthier materials clearly has a positive effect will have an impact on the environment and the health of consumers. In this direction, it is necessary to train/retrain biochemical engineers, chemical engineers, chemists and field-specific equipment operators [1-4].

- **Renewable energy** - the renewable energy sector has the greatest potential to create green jobs. New "green positions" in the sector include, for example, renewable energy engineers, consultants, auditors, quality controllers, as well as installation and maintenance technicians. These occupations are considered new occupations to the extent that the skills and competencies required are largely different from other occupations in the field. Moreover, all of them are medium or highly qualified belongs to workplaces. The new jobs emerging in the wind energy sector will require people with engineering and project management skills. e.g. these're are Wind Energy Manager, Wind Energy Engineer and Wind Turbine Service (Repair) Technician. For example, in Denmark, they came to the decision that there is a need to create a new profession that combines the skills of wind, solar and water energy enterprises. If necessary, this position is conventionally referred to as "climate designer". Surveys in the same field show that employers emphasize the need for such skills as: planning, development, finance and insurance, mechanical engineering and plant construction, electronic construction, fiber-composite technologies, installation and logistics, technical service/repair [4-9].
- **Transport and logistics** - many countries are not only reducing fuel consumption, but replacing fossil fuels with hybrid electric devices/vehicles that use/use compressed natural gas and biofuels. The mentioned change implies that construction companies and various specialists in the field, in particular engineers, specialized tradesmen (eg welders) should begin to implement eco-design principles in their work, and it will be necessary to "green" the vehicle mechanic profession, which will require much more problem-solving and much more sophisticated technical diagnosis skills [10 –14]. The skills required of gas station attendants and workers involved in crude oil processing will also change (Fig. 2):

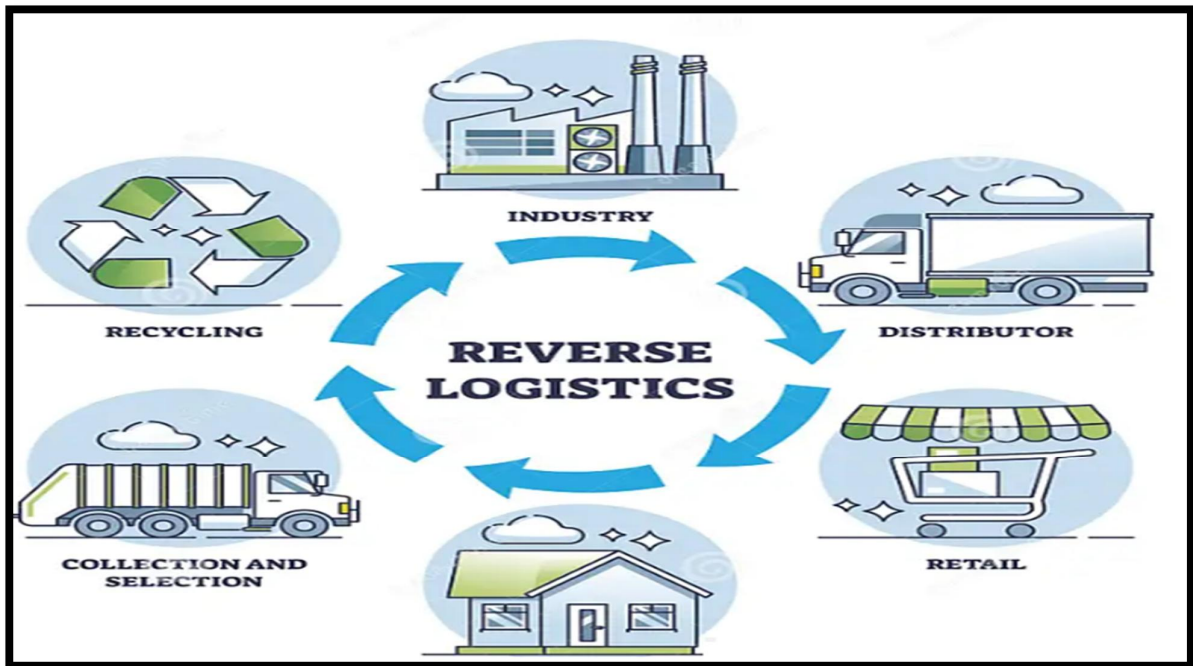


Fig. 2. Reverse logistics support in the form of a green supply chain management scheme

Identification of problems and challenges in the field of transport and logistics is carried out on the basis of a situational analysis, which includes the following steps:

- finding and processing information about existing studies and reports;
- statistical analysis;
- survey of the main players in the market;
- initial identification of challenges;
- holding discussions with market participants and businesses;
- analysis of international practices and approaches.

2. The Importance of Green Logistics

There're several goals that should be achieved by introducing green logistics operations:

- **Measuring and reducing carbon footprint** - by using sustainable logistics strategies, businesses will be aware of the impact of their transport activities on the environment. In this way, businesses can simplify their path to reducing their environmental impact. EN-16258:2013 International Standard contains the preferred and most widely used methods for monitoring greenhouse gas emissions and energy consumption for this purpose.
- **Eliminate or dramatically reduce all sources of pollution** - reducing or eliminating air, water, noise and soil pollution is the main goal of green logistics. The transport industry is undergoing major changes, especially in the way things work.
- **Reduce, reuse and recycle** - when it comes to packaging, green logistics focuses on reusing and recycling existing containers.

- **Saving money in the supply chain** - when companies switch to green logistics methods, they can expect less wasteful operations and a better brand image. It also means that in the long run, less money will be spent on gasoline, packaging, and labor if green logistics methods are used. In this way, sustainable logistics methods are implemented in the company's supply chain.

3. Green Logistics Goals

With the right approach to logistics activities in a company, it is possible to benefit the environment. For this, certain goals are set that must be achieved.

Reducing traffic is one of the priority goals of logistics. It is aimed at reducing transportation traffic. This is especially true for large cities. To achieve this goal, companies create convenient routes that help solve such problems. Employees select addresses and routes that will be less congested. This will allow you to quickly get to your destination bypassing the main routes. Less congested routes cause less harm to the environment.

Emission control is the limitation of emissions of harmful gases that will pollute the environment. For this purpose, modern vehicles that run on environmentally friendly fuel are used. They allow reducing gas emissions.

Minimizing waste is an important goal of green logistics. This especially applies to waste that can harm the environment. As a rule, many types of packaging are used during transportation. This is not only cardboard but also polyethylene film. To minimize waste, logistics companies try to use it as little as possible. A policy leading to the reuse of containers for transportation is also promoted. Film causes great harm to the environment since it is not recycled. That is why its use is minimized. Also, to maintain the environment, packaging containers are made from fluorine raw materials.

4. Supporting Smart Devices in Transportation - Leveraging Big and Open Data

Historically, transport data was collected from fixed points in space - often by counting objects (eg passengers/vehicles). GPS satellite technology, digital data collection forms, high-speed communications networks, and increased computer data processing power have increased the speed, volume, and variety of data collection, resulting in ever-increasing databases that provide insight into how people act and how systems behave [15-18]. The implementation of applications of smart transport systems in the field of road transport allows and forces drivers to instantly react to the traffic situation, select alternative routes, reduce travel costs, avoid unnecessary traffic and getting into traffic jams [19-22] (**Fig. 3**):

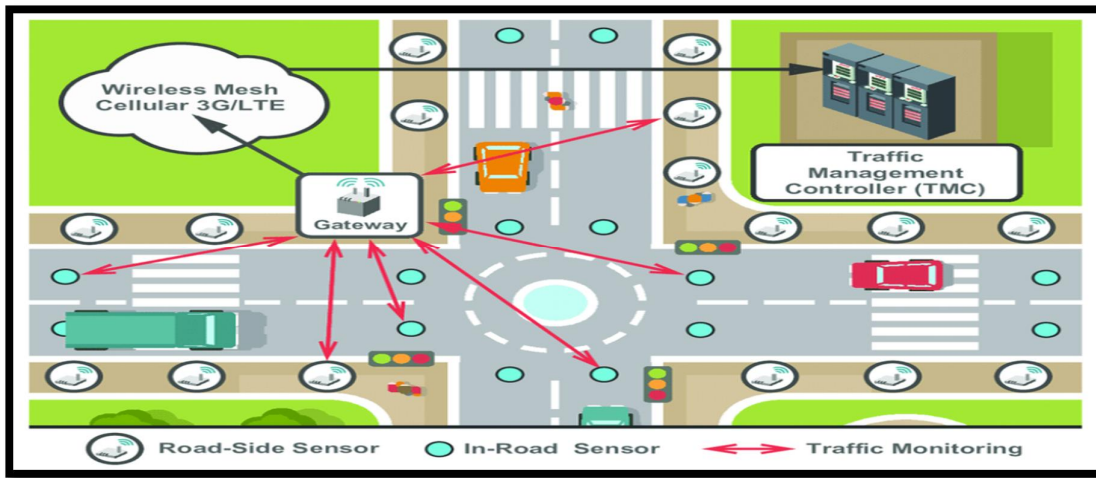


Fig. 3. Communications chain of data feeds in smart transportation

5. Conclusion

Green logistics belongs to the field of logistics management (organizational management); It is a class of complex and large systems. Effectiveness of its business processes for management, it is necessary to design and implement software for the relevant supporting management information system based on the latest information technologies.

Implementing green logistics will allow you to reduce your carbon footprint and operating costs, as well as build a better supply chain, demonstrate your commitment to sustainability and strengthen your brand among customers and employees.

By using green logistics, you can make a real difference in the world and help protect the environment for future generations. Using green logistics helps minimize inefficiencies, increase transparency, and make proactive decisions about the supply chain. - As a result, transport companies will be able to reduce fuel consumption, reduce emissions, and save money by applying best practices in the cargo supply chain.

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