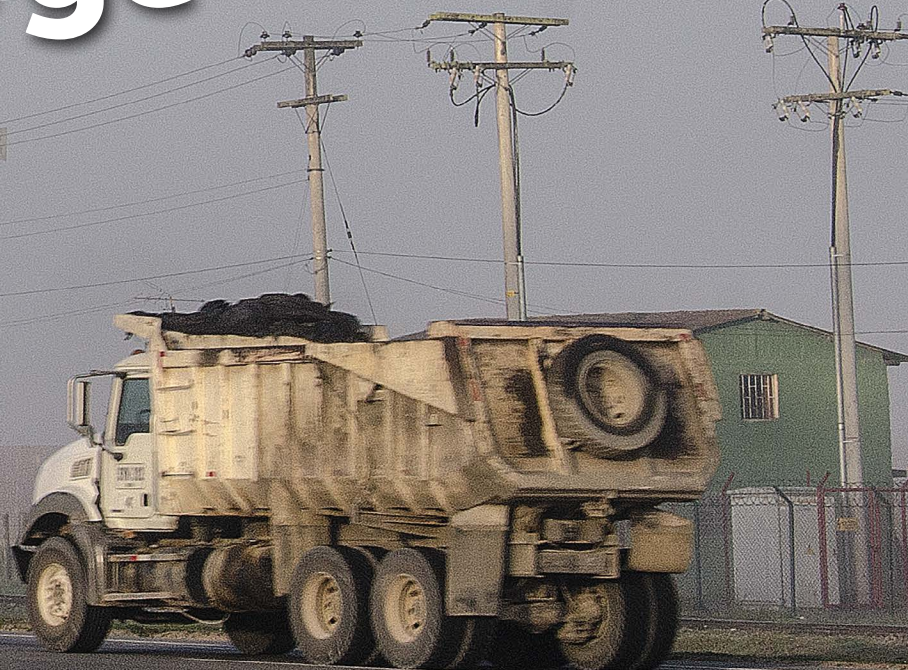


# Environmental factors and logistics processes: more than a transient upsurge



By José Alejandro González T.  
Photos Alberto Sierra

Environmental factors have a role to play in improving indicators in logistics chains, when these indicators are based on mathematical models. The resulting impacts are currently being researched by the School of Management and Business.

All logistics processes undertaken by organizations have an impact on the environment. For example, the vehicles selected for delivery purposes, the routes these must take, and even the type of products transported all involve CO<sub>2</sub> emissions that end up affecting the environment in some way. “A firm that has no environmental impact is a firm that is not doing anything,” points out Carlos Franco, professor at the School of Management and Business at the Universidad del Rosario.

According to a study by the National Autonomous University of Mexico, a good plan for distribution processes can lead to savings of between five and 20 percent on overall transport costs, which in turn adds up to between 10 and 20 percent of the final cost of the goods. But how do environmental factors affect these processes and how can they be used to optimize them?

A recently-revealed project by the Logistics and Production Administration of the Universidad del Rosario’s School of Management and Business delves precisely into these scenarios, seeking to determine the way in which diverse environmental factors can influence the making of logistics decisions, based on mathematical models and solution algorithms for these combined problems, involving the habitual high complexity in routing and inventory management found in industry. “The project looks at how the literature has suggested a variety of metrics for determining environmental factors with a root problem within the logistics chain,” says Franco.

The first phase of the research uses a review of the previously-formulated ideas to study what different metrics or factors have been proposed for carrying out measurements of all elements related to the environment which affect the logistics process.

“Working from the literature, we focused on seeing what factors are involved and how they are measured in a mathematical formula. Here there are many forms of measurement and ideas that attempt to measure CO<sub>2</sub> emissions from vehicles based on fuel consumption, certain variables such as type of truck, class and weight of the load, and distance travelled, among others,” explains the professor. These variables take into account some inventory products that themselves generate emissions.

To date, the researchers have checked close to 70 articles with indispensable relevant ma-



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terial, taking into account different elements for putting forward mathematical models that can provide environmental indicators.

“The simple way to carry out these ideas means tracking each lorry and measuring how CO<sub>2</sub> is given off in each phase of the journey. This, however, is ruled out due to the high costs and huge quantity of persons that would be required. The best option is to study the literature to see what studies and findings have already been made,” he says.

At a later stage, the project will determine how these mathematically-measurable factors and emission sources can be built in to models, and to see how they affect the performance of chains in both logistical and environmental terms.

Once it has these metrics, the School will find out how logistics chains are affected and how they can help organizations to minimize their costs, maximize profits, and meet the desired customer service levels. It will determine how the environmental factor will modify the supply chain while simultaneously allowing for improvement of indicators.

“Based on the review of different pre-existing metrics, the group’s aims include taking the cases identified and the base problem in order to construct indicators that might enable measurements in logistics processes and environmental factors,” says Professor Franco. These metrics would be employed to create an analysis that shows how logistics costs are affected, the number of times a customer needs to be visited, how to reduce fuel consumption—or CO<sub>2</sub> production—and how many vehicles to use and with what loads, for example.

It should be pointed out that the formulas identified are standard, and for this reason they do not change according to either the location or city where they are applied.



But these studies certainly attempt to measure consumption in some way, although their application can vary in different ways. So, for example, if they are used for obsolete trucks—the case of many found in Colombia—the results will be different

to those obtained using latest-generation vehicles, which tend to share similar consumption figures. The resulting abstracts come from different data such as type of load or product, weight of product, whether products have emissions—there is an emissions table by product—distance covered (in which GPS information is ‘translated’), and the type of truck. “We also have a model that shows consumption in both electric and hybrid vehicles, which is another kind of environmental approach,” the expert explains.

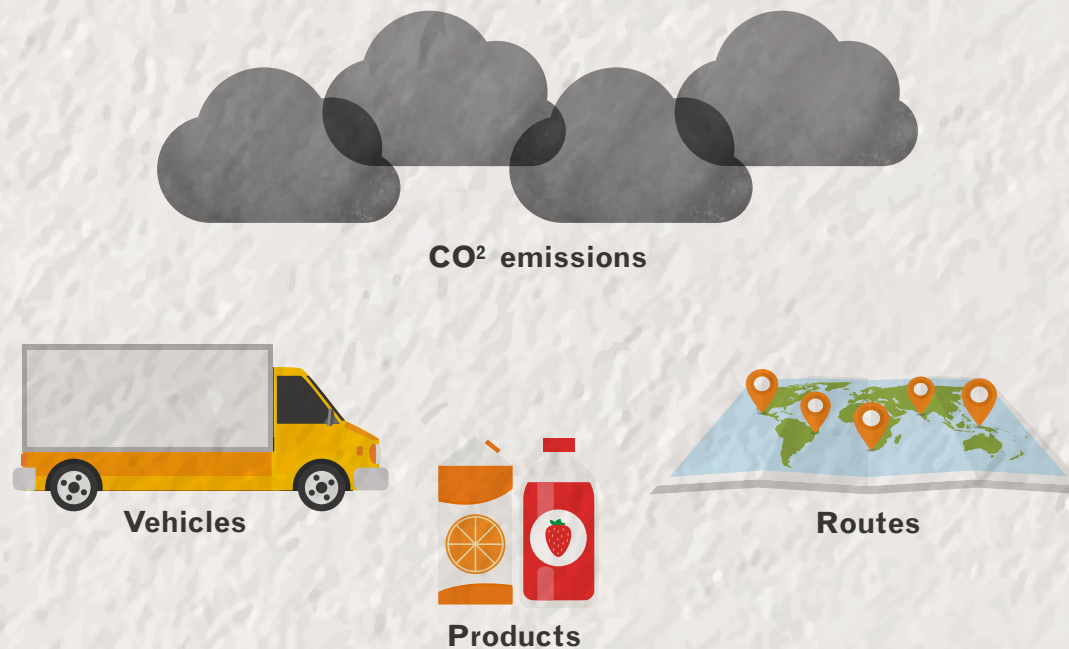
Environmental factors are more than a passing upsurge. They sometimes help to show key elements in the taking of decisions that are worth including in logistics processes. And they also offer benefits that can be added to the features of products in order to give them increased value for consumers, such as through “Green Seal” types of certification.

Perhaps the most important aspect of environmental factors, however, is that they allow organizations to spot key points in route planning, distribution, and the management of inventories, factors that may allow for emissions reduction and improved quality of life within the communities where their businesses operate. ■

**PERHAPS THE MOST IMPORTANT ASPECT OF ENVIRONMENTAL FACTORS, HOWEVER, IS THAT THEY ALLOW ORGANIZATIONS TO SPOT KEY POINTS IN ROUTE PLANNING, DISTRIBUTION, AND THE MANAGEMENT OF INVENTORIES.**

# THE GREEN IMPACT

All the logistics processes carried out by organizations have an impact on the environment



How do environmental factors affect this process and how can they be used to bring about optimization?

Metrics and environmental factors

Measurable, logistical, and environmental emission sources

Good planning of distribution processes can lead to savings

**BETWEEN 5% AND 20%**  
 saved on overall transport costs

**BETWEEN 10% AND 20%**  
 saved on the final cost of goods

These metrics would be implemented in order to construct an analysis showing the cost in logistics, the number of times a customer must be visited, how to reduce fuel consumption—or reduce CO<sub>2</sub>—and how many vehicles to use and what to load them with

Minimize your costs, maximize profits, and meet desired customer service levels