



## MIT SCALE RESEARCH REPORT

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This reprint is intended to communicate research results of innovative supply chain research completed by faculty, researchers, and students of the Global SCALE Network, thereby contributing to the greater public knowledge about supply chains.

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**Research Report: ZLC-2009-4**  
**Global Supply Chains: Tariff and Duties Optimization**  
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## Global Supply Chains: Tariff and Duties Optimization

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### EXECUTIVE SUMMARY

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Large corporations operating in new markets are developing complex distribution networks in order to meet the demand at a lower cost, while taking advantage of countries with lower labor costs or more economic raw materials. These companies also have to follow different regulations imposed by each country, to be able to establish their own operations. Springing from the exploitation of these new markets, new regulations have appeared as internal policies for trade and measures for protectionism.

The logistic structure derived from this globalized growth implies not only an additional intricate level of operations, including production and transportation processes, but also additional costs regarding the location and specific commercial laws of each site. As part of these new cost structures, tariff rates and local requirements appear as complex variables, both as new procedures to manage and also as additional financial costs for the logistic process, which deserve attention, since they could generate large amounts of savings in resources and in logistic procedures if well handled.

The importance of this research relates to the significant amount of money that companies can save using the optimal distribution scenario by defining their flows of materials in an optimized approach. Subsequently, an efficient combination of suppliers, transportation costs, and tariffs can, in fact, make a difference in the logistic costs for any company. Therefore, this study tries to minimize the impact of these variables through a linear programming model, which allows the testing of different scenarios to find the most efficient distribution path when facing various options of supply flows, beginning from the purchasing of raw materials from diverse suppliers to the distribution of finished products to different locations.

#### **Approach to the problem:**

- The first step was to understand the real situation of an automotive company, the complexity of product movement during a year, and the amount of money spent on duties. Simultaneously, the implications of international trade agreements and special conditions that exist in certain countries were taken into consideration.
- Next, a linear model was developed to include the most important costs that affect a distribution network, including all the constraints generated from local policies and international trade agreements.

## Global Supply Chains: Tariff and Duties Optimization

- Then, a sensitivity analysis was done to examine the impact on network costs and distribution paths when there are variations in determined conditions such as demand, duties, capacity, local requirements, and so forth.
- Finally, conclusions were drawn based on the results of the sensitivity analysis, both for the actual situation and in the case of changes in tariffs and other trade policies or variables, as described below.

### **Key Findings:**

- Under the actual import duties scene, countries with low labor and manufacturing costs try to supply as much global demand as their capacity constraints allow. Companies with a large network can take advantage of this by trying to have several suppliers in some of these countries, as competition between them will bring a reduction in the supply chain total costs.
- If these countries increase their production capacity, they would tend to cover the global demand, unless import duty policies change in countries with higher production costs. Then, companies with plants in countries like the USA will tend to produce internally and not import large quantities, as duties and transportation costs will not compensate for low manufacturing costs.
- Changes in local content requirements such as the percentage of local components that each final product must contain in order to allow a company to set up a manufacturing plant in a certain country, also have a great impact on the network cost. In the current situation, it is not hard to follow this requirement in many countries. However, companies should foresee possible variations and know how such requirements might affect them. This model is a good tool for forecasting what the implications will be when these alterations in international policies occur.

### **Recommendations:**

In the light of our key findings, we recommend that companies with large or developing distribution networks revise and test frequently the total supply chain performance, both to measure current results, as well as to foresee future situations that could impact any efficiency reached. Since each company develops its operations in totally different environments, none of which are identical, we strongly recommend the use of this model to test any possible scenario related to the complexity of duties and international trade policies, which could impact supply chain efficiency.

Areas of further research in the automotive industry would be to see which are the most efficient components that a *kit*, or partially assembled vehicle, should include and determine if the optimal *kit size* could depend on the route. Another area of study could be to analyze the supply chain costs as a portion of company profitability, and add that to the current model developed in this thesis.

