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Analysis of wood transport practices and infrastructures to anticipate regulatory constraints

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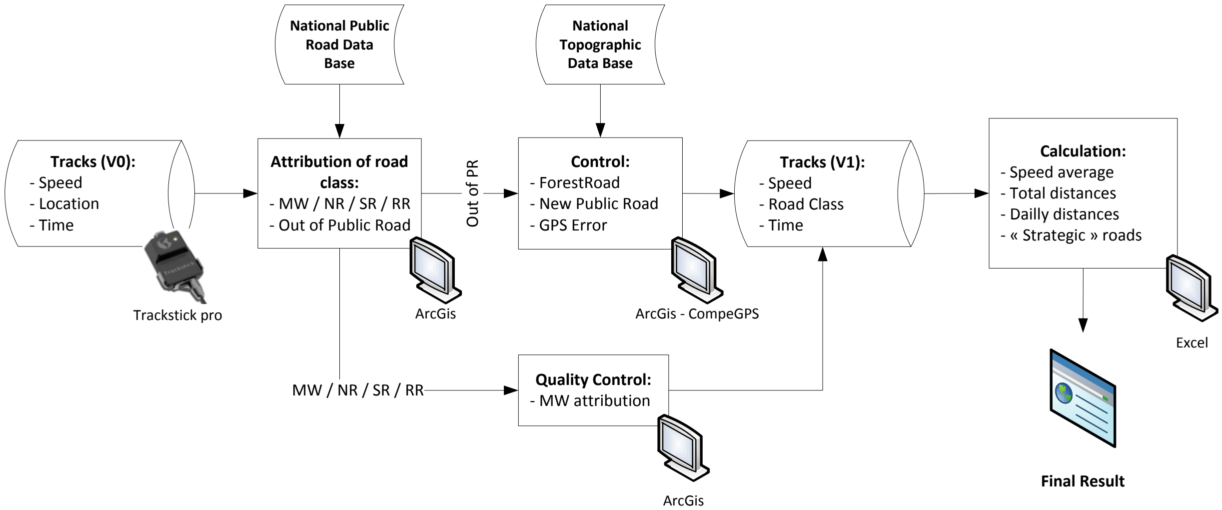
The transport sector has been facing more and more constraints for the last decade: regulation, economic, circumstantial, social and environmental constraints …Wood transport is no exception. Studying the impact of a new regulation on the wood transport sector implies a modeling work. But input data to run these models are often lacking which results in being forced to propose inaccurate estimates. These extrapolations limit the relevance of simulations. However tracking technologies are nowadays increasingly successful and necessary equipment for such analysis are becoming common even in the life of every day. Simple GPS trackers can provide very useful information for fleet management or scenario analysis of possible implementation of new financial or regulation measures.

A study based on such GPS tracking system has been carried out by FCBA, in order to become better acquainted with wood transport practices, especially with the behavior of lorries in terms of typology of the most used roads, speed profiles, driving times. This study was run within the European project NEWFOR which involved six European countries of the Alpine area thanks to the financial support of the European Regional Development Fund: Alpine Space.

After a brief description of the methodology, three examples will illustrate how results can be used to anticipate forthcoming changes in the legislation. For this study, GPS tracking devices have been placed in height trucks during six week. Three topographic areas were considered: plain, hilly area or medium mountains and mountains; each area is respectively represented by the Aquitaine region, the North East of France and the Alps. The choice of these three areas was related to their major differences in terms of operation (whether the material and the logistical point of view) but also their heterogeneity in terms of geographical constraints (topography, density of forest and typology of public networks).

During one month the devices collected the instantaneous speed and position of each truck. With these data, a post-treatment was done. Each data was classified first in relation with the type of road the vehicles were driving on. Public network data was simply verified to avoid any conflict treatment to impact on data, such as bridge or tunnel. For the rest of the points (not present on the public road network) a post control was accomplished based on the forest cover and sometimes a specific control was performed on the basis of ortho-imagery. The figure 1 is a global view of the treatment process.



Note: MW = Motor Way / NR = National Road / SR = Secondary Road / RR = Rural Road / PR = Public Road (Network)

Figure 1: Process used for the transport qualification

One of the first data accessible with such equipment is the different speed averages for each road class. This is useful information as an input for transport optimisation software. It enables the creation of speed profile for every situation of transport (mountain area, type of truck…). In the study, three speed profiles have been generated, in the three different regions of test. With the use of such information, the optimization software is even more precise and allows important gain in transport. If one does not consider the information related to the speed profile (specific of the area and the vehicle), it could, in the case of a deployment to France, generate variances for regular daily journeys of more than 25% of driving time.

The same distance (333 kilometers, the average daily work in France) driven in Alpine condition will take approximately 2.44 hours more time than in a south west condition. This huge difference is explained by the different types of material and the topographic conditions present in each situation. In the table below (Figure 2.) the different speed profiles and their respective difference with the national average are displayed. According to those speed profiles, for an average distance profile of 333 km per day, such distance will require 5 hours and 35 minutes in the south-west, 6 hours and 27 minutes in the north-east and 8 hours and 2 minutes in the alpine space.

Type of Road	NATIONAL (Average)	South-West		North-East		Alpine space	
MotorWay	16%	14%	2	25%	9	11%	5
National Road	15%	2%	13	28%	13	23%	8
Secondary Road	63%	79%	16	44%	19	58%	5
Rural Road	4%	4%	0	2%	2	7%	3
Forest Road	1%	2%	1	1%	0	1%	0
Daily distance	***333 km/day***	***417 km/day***		***268 km/day***		***317 km/day***	

Figure 2: Proportion of mileage realized per type of road and difference with the national average (in % of km)

Such data also gives the opportunity to highlight the impact of a potential new taxation scheme (such as ECO-Tax under discussion in France in 2013). With knowledge of an average transport type, it is possible to simulate with GIS software the potential impact of this evolution on costs.

From then, two approaches were investigated around the environmental tax topic:

- A global approach in the early discussions: With the objectives to bring arguments to professionals in their discussion with the government.

- Then in a second time, a more precise case-by-cases study to predict what would be the impact of the tax, based on three major parameters: global distance, transit areas, type of truck (EURO class of the engine).

At this time, it was not yet known that the environmental tax would be cancelled just before its implementation. However a discussion about a similar project is underway and the methodology can be applied again if necessary.

Regarding the global approach, the knowledge of the types of roads used by timber carriers has allowed us to model the transport business of the French companies. Distinguishing between local, regional and inter-regional transit, we have been able to estimate overall for France the kilometers traveled for transporting wood, subject to environmental tax, and so the cost for the timber industry. In this first rough approach, we estimated the additional cost generated by the tax fee to reach 10 to 17 million euros for the whole timber shipping industry. This would represent an additional cost of 2.4 to 4% for road transport of wood. Since this estimation was based on a very rough holistic approach, it seemed appropriate to clarify it through several case studies, detailed below.

In the second approach, the data collected by GPS was used to precisely identify the origins and destinations of each tour being monitored. In this way, it was possible to rebuild the journey, identify the length of the sections subject to environmental tax and calculate the cost of the tax. Based on real itineraries (usual practices), the future raise of transportation cost was predicted to between 0.04 and 0.11 €/km for a wood transport company. In the case of a company in the north east of France, the calculated cost was around 550 and 750 € per month. With the data, it was also possible to calculate the percentage of taxed kilometers compared to total mileage. In a second step, a customized work becomes possible with the transport company. It is indeed possible to look at each tour or regular itinerary to determine if alternative routes, less exposed to environmental tax, are possible: hence calling for an adaptation of the routing optimization to reduce the percentage of taxed section.

The third example relates identification of strategic roads for wood transport and “black spots” in order to assist transport policy and to update French ”Itinéraires Bois Ronds”:a limited part of the global network on which it is allowed to operate with heaviest gross combination weight, 48t or 57t depending on number of axels. This arrangement was set up in France to authorize specific payload for the transport of round wood. This derogation is available only on specific routes defined by the administration of each department.

The challenge has been to identify what should be the network of authorized routes. To answer this question, working groups were set up to provide proposition on the network to the administration. The use of embedded devices has allowed some departments to better understand the habits of carriers. It was also possible to cross this approach with forest production forecasts in order to anticipate future flows of trucks. This identification of “strategic” roads to transport timber is another interesting example of the possibilities offered by tracking device in trucks. Nowadays, there is important difference in France for this network. Some departments build a network without any cooperation with neighboring areas and real logistical problem are still in place. The departments who implemented this approach with FCBA have built a logical authorized road network.

For example in the region Rhône-Alpes: 450 kilometers have been authorized in Savoie against more than 6 000 kilometers in the department Isère. The reasons of such difference, as illustrated in figure 3, are based on the lack of knowledge on the true bearing capacities of permanent structures such has bridge. Quite often, precautionary principle applies and ultimately creates additional complications for the practice of timber transport. Tracking data are a real tool for the decision to allow a dialogue between professionals and roads managers within French administrations.

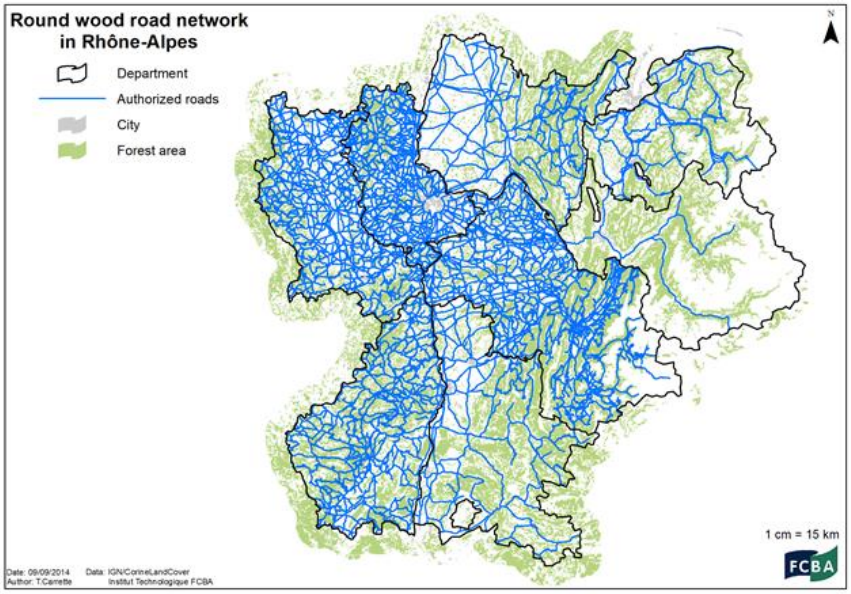


Figure 3 Round wood roads network in a French region (Rhône-Alpes)

This abstract illustrates a part of the potential of tracking device to anticipate, in a constructive multi-stakeholders dialogue manner, the implementation of new regulations. Those data are very useful to find alternative solution based on real application and not only prediction. Other uses of this type of data are also possible such as identification of difficult nods, or help in the management of infrastructure. It can be a real support for the mapping service in the forest sector. All of these data requires the involvement of carrier in sharing their information.

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