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TRANSPORT AS A SERVICE : PERFORMANCE AND EFFICIENCY. FROM CONCEPTS TO MEASUREMENTS.

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Services have been highly developing for forty years. Freight transport, like health, data processing and distribution, has become a dynamic branch. In France, freight transport by road (FTR), is the leading mode. It requires a large labour force and creates new activities of packaging and handling which need skills and technical capacities. But this situation creates collective problems such as environmental effects or social crisis inside the branch of activity. The contradiction between this development and its limits, could be assessed through the analysis of "production" and performance in transport (expressed in ton.km), but the methods of calculation do not seem adequate.

Thus, we can consider if the figure expressed in ton.km increases between two periods of time, the "production" of transport goes up. But we are unable to know which elements contributed to this situation. We especially miss organisational aspects and skills determination (Artous, Salini, 1997). Those arguments are beginning to be taken into account by the government and several research programs.

The focus of this article is on the following question : what could be the determinants of performance of a FTR service ? It constitutes the main problematic of my PhD program, begun in December 1999. This paper will constitute a presentation of my steps of research.

To answer this question, we will combine two approaches : the economics of services and the French regulation theory. The former uses new methods of evaluation concerning output and performance in services, the latter could enable to create a link between the micro-economic level of the economics of services analysis, and the global considerations that are of interest to us (as environmental and social aspects). We wish to illustrate our work through the example of the transport of endive in the North of France, Belgium and the Netherlands.

In the first part, we will present the situation of FTR in France, according to its development and the inherent problems. In part two, we will suggest an approach via the Economics of services and the determination of the output and outcome of transport. In part three, we will focus on the regulation approach and our empirical case. We'll try to define a possible method of evaluation for our study.

I) The French situation of transport and consequences

1) The leadership of Freight Transport by Road...

As in other countries, Freight transport by road (FTR) has taken a main part in modal distribution in France. Thus, FTR represents 75% of the total (1500 million of ton), freight railway traffic : 16 %, inland waterways mode : 9% (INSEE, 1999). The transition in the modal leadership took place in the 1970's, when FTR grew above the railway mode. This trend should be the same for the next few years : increase of the share of the part of FTR, stabilisation of the part of rail, falling of the share of waterways. What could be the reasons of this situation ?

Many explanations could be given. First, we can find an answer in the French planning of infrastructure development. Since the 1960's, France has possessed an important high-way network : about 11.000 km. It represents 30.000 vehicles per day. As a comparison, the "departemental" road network counts for about 400.000 km, for 1.300 vehicles a day (Ministère de l'équipement, 2000). All the main cities of the country are linked by this highway network, and thus it facilitates the circulation of lorries and heavy goods vehicles.

A second reason could be the evolution in methods of production and distribution. A lot of firms adopt "just-in-time" organisation, where flexibility, adaptability and reactivity have become the leading words. Logistics appeared in order to optimise goods flows. The Nord Pas de Calais region is a good example of this kind of evolution : many firms are specialised in mail order business such as "La Redoute". These firms often undertake to deliver goods in less than 24 hours.

Other reasons could be advanced: lorries have become more reliable and faster. "SNCF" (the French railway company) has also decided to promote passengers transport (TGV) more than freight transport.

As a conclusion, in Belgium the domestic modal part of FTR is of 73% with 440 million tons hauled in 1997 (National Institute of Statistics, 2000). In the Netherlands, the road

haulage is of 421 million tons in 1997 (81% of the domestic modal part) (Statistics Netherlands, 2000).

2) ... that triggers some limits

What are the characteristics of FTR in France ?

FTR mainly concerns small packages. 3 consignments out of 4, have a weight lower than one ton, and the price depends more and more on this level of weight. The higher the tonnage is, the lower the price is (Guilbault, 1994). The distance of transport has also become shorter : The main part of FTR takes place within a distance of less than 150 km. Transport by road is more and more assured by specialised firms. And, there are less and less manufacturing companies which have their own fleet of lorries (industrial carriers).

What does it trigger ?

This evolution of FTR creates problems in France. A lot of people are beginning to criticise this situation. First, there is a problem of congestion in certain main cities such as Paris, Lyon or Lille. Roads are saturated, and the causes are often imputed to lorries. Second, environmental meaning has emerged. Pollution generated by traffic involves FTR, so there is a will to prevent lorries from going through certain towns. These considerations are strengthened by the risks of accidents. Several cases of lethal catastrophes, shocked French people.

Claims and limits also appear within the FTR industry itself. Recent strikes in France have shown the limits of the development. The lorry drivers working conditions (the average time of work level is 54,4 hours a week in 1996 (OST, 1996)), reveal the necessity for new rules in this industry. The French government has begun to regulate the system, more particularly concerning the relations between the carrier and his customer (92-1445'Act) and the reduction of labour time.

The 1999 Act (99-533) for regional planning, settled new bases concerning the environment. The Government wants to promote alternative modes of transport. Instead

of exclusive lorry utilisation, methods of combined transport could be taken into account, but for the moment, it only concerns specific and long distance freight transport. It is developing slowly.

Another part of this act concerns the infrastructures. The Government has decided to promote and improve the existing network instead of building new roads. The main objective is to assess the real needs of transport users, in order to develop a sustainable system of transport.

3) The need for a new analysis of performance in FTR

The rates and figures about the development of FTR hide some aspects of the real situation of this industry. It seems necessary to analyse FTR, not only through the infrastructures needs and environmental considerations, but in a more complex dimension.

Manufactures of goods do not often possess their own float of lorries. They use the services of specialised firms. Each kind of transport is specific, it depends for example, on the good itself, on characteristics of the result, and on the decisions from the customer. It means that we must consider FTR in its whole dimension, from the purchaser to the customer.

Transport in general, and FTR more particularly, is considered as a service since it "does not transform the goods, but increases its value" (INSEE, 1999). This is justified if we take into account for example, a possible definition of the service : intervention on a "reality" held or controlled by a third party. It will be advisable to precisely determine what the service with FTR covers. In appearance, it seems easy to analyse :

Transport appears to be composed of activities where the determination of the output seems *a priori* easier than within others (such as health, education for example). This seems due to the link of the service with the hauled goods, and to its apparent standardisation. Under these conditions, the methods of calculation of the output and productivity are primarily based on "industrial" methods. They essentially consist in resorting to ratios of the type ton-km/employment/unity of time or ton-km/number of vehicles/unite of time. The explanatory factors of the productivity of the capital are

given for example, by the power and the speed of lorries, the utilisation service time, the capacity, the rate of filling, the state and the availability of the infrastructure, etc. It leads to a productivity gain of 44% between 1986 and 1994 for FTR (OST, 1996). It explains the reason why the French Ministry of Transports often presents an infrastructural answer to the needs of carriers and their customers (cf. assessments of SETRA (2000) ; Club d'échanges sur l'Economie du Transport de Marchandises (2000)).

With regard to the determination of value in transport, the usual methods are currently the following : margins are calculated with the data of traffic per mode at the finest level, to which are applied prices to obtain a value (INSEE, 1999)

These methods lead to the following conclusions : FTR gained in productivity by +2,4% from 1997 to 1998, its value grew by +6,6%, and employment increases by +3,8% for the same period (INSEE, 1999). These data have been evolving on a standard trend for 10 years.

Nevertheless, some critics were already formulated about these methods (Artous, Salini, 1997), recalling that ton-km is not an indicator of activity and does not measure the value of the service. It also seems difficult to measure the content of work for drivers (in terms of time, tasks or skills).

Several research programs in France attempt to resolve these limits, in order to develop new methods of analysis of services production. They also enable to take into account the environmental preoccupation, and the social aspect. FTR, as we noticed, is particularly concerned.

We will try to understand the strategic phases of creation of a service with one of these programs : the Economics of Services.

II) The Economics of services

The Development of services in France, and in OECD in general, is particularly important. Data processing, distribution, transport and health are some of the main branches of services. Private services employed 10 million people in France in 1998, composed to 4 million in the manufacturing industry (figures were respectively 8 and 5

in 1980) (INSEE, 1999). Many theories tried to explain this job increase by the lack of productivity in this branch (for example : as costs of labour are often low in services, employment increases). We consider that these conclusions come from traditional methods of calculation of performance in services which are not always suitable. They mainly use inadequate tools from the manufacturing industry.

In FTR, figures and analysis exist, but they don't reflect the real situation of this branch. As we said, we can not reduce productivity to units of ton-km or vehicles-km. In this way, we have no elements concerning the organisation, skills and the nature of the transport. We would like to use the approach of Economics of Services, which gives alternative analysing tools of productivity.

1) What is a service...

As we mentioned earlier, we are trying to analyse productivity and performance in FTR. First of all, we define what a service is in the way Economics of services does :



(Gadrey, 1996, p 171)



"a service is an operation, aiming at the transformation of a reality C owned or used by a customer B, with the operation carried out by a provider A, on the request of B (and often in interaction with B), but not ending in a final goods likely to circulate independently from C." (Gadrey, 1996, p 171) We can represent it as in table 1. In this table, we just added a third actor, the consignee D. He may not be the buyer of the service, but he can step in the relation with his own logistic units and equipment.

The reality C has been modified and shaped by the supplier A for B. C in FTR, is the freight. There is no tangible and material modification of the transported goods, the "reality" has only evolved. It's this reality that we have to analyse.

The following points will focus on a possible way of analysing FTR service, and its performance for specific goods. Three times will be represented : the question of performance, output and outcome of the service.

2) The question of performance

Basically, productivity is explained in this way : Y is a function of K and L at a time t

(1)
$$Yt = F(Kt,Lt)$$

Y means the output, K the level of capital, L the labour, F0 a production function in time t=0.

Productivity of capital in time t is then : $P^{\circ}K(t) = Yt/F0(Kt)$

Productivity of labour in time t is : $P^{\circ}L(t) = Yt/FO(Lt)$

In transport as we said, productivity is expressed through the capital in ton.km (cf. OST, 1996). In no way, does this representation (1) give an expression of the real output of the service, even in transport. Productivity is a valuable concept when the output is stable, the production process is rigid and when the articulation between the different parts of production is easily built (Du Tertre, 1989).

If we take into account an activity of service such as transport, the analysis of performance could be regarded as follows :

- We suppose that haulage is specific to the transported goods;
- Three main actors are concerned in the conception of the service in FTR (table 1);

- We think that we can not understand transport without taking into account the "sphere of production" of goods.

With these three hypothesis, we consider the approach of production and performance in services from Gadrey (1996).

Gadrey (1996) determines two steps in the determination of the production of the service. The first one is the **output** (the direct service). It corresponds to the "obligation of means". The second one is the **outcome** (the result). It corresponds to the "obligation of results", it takes then into account the effects of the service on a longer period. We will first try to adapt these two concepts to transport.

2) The output

The output corresponds to the utilisation of resources (Capital and labour force).

Performance (efficiency) corresponds to the best possible utilisation of resources implemented. The methods of OST correspond to this kind of determination. Tasks or the way transport is "used" by the consignee, are not taken into account.

In this case, 2 dimensions of comparison are offered, we call them : "short term" and "longitudinal". The difficulty is to find regularities and typologies of cases :

- In the **short term**, performance can be measured only in short duration for a typology of similar services. In fact, it concerns the same objectives and goods, the places are characterised by the same charger and the same consignee. It is advisable to locate tasks, working times, technical and human skills and costs in order to compare them between two short periods of time for example. We are here close to the standard approach of evaluation which was presented in the first part.

By short term, we mean "regularities" during a certain period. The difficulty is to make abstraction of elements that could influence the haulage. Without anticipating, for endive, in the next point, we'll compare the 1980-90 period and the 1990-00 one. These two periods each have regularities and are specific. Comparisons could be made within them.

Longitudinal means the comparison in transport for the same goods but in different organisational and spatial ways. For example, the difference between the industrial carrier and private haulage for the Nord Pas de Calais region, Holland and Belgium. At this level, it is appropriate to consider the differences in tasks, working times, technical and human skills and costs for different organisations of transport in the three countries.

3) the outcome

The outcome implies the effects on a long trend as well as the relevance of C in comparison with the sphere of production and what constitutes the environment of the goods (Gadrey, 1996). The interest is :

- to understand the genesis of the objectives of the service : what do they aim at ? How do they take place ?
- to know the effects and impacts of the output on the organisation of the sphere of production, as well as the influence of the sphere on C and its performance.

It will consist in assessing "the impact" of the elements belonging (or not) to the productive sphere on C, and in return the impact of C on the sphere and its environment, knowing that each period is characterised by facts and institutions likely to distinguish them.

We will try to show correlation between, on the one hand, the output expressed in terms of costs, T.km, skills, tasks, working hours, and on the other hand the evolutions inside the sphere of production and outside it in the different periods of time. The interest would be to understand the genesis of institutional forms (institutions, rules and conventions) suitable for the management of C, and to have a qualitative vision of it. We also expect our work to find indirect answers concerning the environmental and social effects.

Nevertheless, we see with the analysis of the economics of services, that we're on a micro level (we focus on three actors), and there could be difficulties to reach a macro one (for a branch of production for example). It's visible when we try to consider the

outcomes of the service. In the following chapter, we will try to analyse these aspects, by considering a specific goods and its organisation of transport. In this way, we will present our study of the performance of endive transport in the North of France. As we have just started this work, we will mainly put forward some propositions. We know that we will limit our study to one specific good, but it enables to provide arguments about the strategies of actors according to these aspects. In this way, we will try to articulate economics of services and Regulation theory.

III) The empirical approach via the regulation theory

We considered in the previous chapters of this article, that assessment of performance in transport, and more particularly FTR, contains limits. We suggested using the tools of economics of service in order to solve them. Our hypothesis for this chapter, is that transport takes place in a **context**, this means that we can not assess performance of C without taking into account the actors who are involved directly or not in the production and distribution of the concerned commodity. As we have just begun our empirical study, we will not determine the output of service, but will try to explain the context in which transport evolves.

Thus, the questions would be : What are the characteristics of a context ? What are the possible relations between this context and the way the goods are transported ?

In order to answer, we will present our work in three steps. First of all, we'll choose to assess the context in which transport takes place thanks to the French theory of regulation. Second, we'll present our case study, the endive transport in the North of France, Belgium and the Netherlands. Third, we'll give some propositions concerning the evaluation of endive haulage as concluding remarks.

1) The French Theory of Regulation

In chapter II, we tried to consider the question of performance in FTR through the arguments of Economics of Services. This basically micro-economic theory prevents us from developing a meso and macro perspective. The latter has a very important part to play in what we called : the context of transport. This means that we will consider the

three actors included in the service relation, in a context or in a sphere of production (characterised by people, structures, etc.). But, we keep in mind the central element of our study : freight.

For example, we suppose that history, norms and rules could be significant features of the service. If the organisation of production evolves, the way the goods are transported could change too. In order to assess this context, we have decided to choose the regulation approach. The Regulation Theory is a neo-structuralist approach which calls for inter-disciplinarity and which gives a primary role to history, to institutions and to strategies of social actors in the analysis of growth regimes and of national development modes. Regulation objects to the abstract normative universalism of the standard economic model. Regulation considers that the reproduction of societies goes through the construction of macro-economic and macro-social coherences which can be caught thanks to the institutional forms taken by the basic structures of the society (Theret, 1998).

We will consider a specific stream in the Theory of Regulation, the sectorial approach of regulation. We do not just consider an economy as a whole, but as a branch of activity. The main works on this aspect have been provided by Bartoli and Boulet (1990) and Du Tertre (1990, 1995). The former worked on production of wine, the latter studied the Building industry and services. The interest of this sectorial approach is that we could have tools to study what we called the context of the transport of endive.

Bartoli and Boulet define the "sectorial regulation" as "the combination of **economic regimes** and **institutional devices**, this combination must be regarded as a process and not as a solidified state, and thus studied in dynamics" (Bartoli, Boulet, 1990, p 19). A sector could concern a goods in particular, it is determined as a sphere of production.

The **economic regime** is "the set of economic mechanisms ensuring over one period the reproduction of a sphere of activity" (Bartoli, Boulet, 1986, p 19).

It is advisable to find a "relatively durable cohesion between logic of production, logic of consumption, logic of exchanges, making it possible to characterise a certain type of economic regime equipped with stability and reproducibility, in certain cases" (Bartoli, Boulet, 1986, p 19)

The macro-micro articulation is not excluded from this fact. It is advisable to specify it correctly (cf. table 4 page 17) :

- the "institutional forms" (cf Boyer, 1986) at the macro level condition the "institutional devices" at the sectoral level. But the evolutions of the latter, can also contribute to modify certain institutional forms.
- the characteristics of the regime of accumulation create drawbacks and opportunities for the "economic regime" (at the sectoral level), but in return the latter can have an impact on the mode of accumulation. (Du Tertre, 1995, p 320)

The institutional devices at the sectoral level "correspond to the set of productive institutions of rules, process, interventions which frame and drive these economic regimes" (Bartoli, Boulet, 1990 p 19).

The regulation approach could help us to determine the context of transport. We now try to illustrate this through the assessment of the institutions which could influence the process of the service.

In order to portray this proposition, we will focus on the example of the transport of endive in the North of France (that we will compare to Belgium and the Netherlands).

3) The example of the endive production

The Nord-Pas de Calais region (in grey) is composed of the two territories in the North that are the largest endive producers in France, and the Picardie region just beneath (the second largest producer) (cf. table 2). It represents 83% of the national production which is of 235000 T. In Belgium, the production is 80000 T, and the same in the Netherlands (CELFNORD, 1998).

Endive is a biannual plant in the north of Europe, whose development has two phases : the first one takes place in fields during about 150 days, from spring to autumn. The plant develops a bow of leaves which permit sugar synthesis ; then, in a second time, in spring ; after a period of hibernation and greeness thanks to winter cold, the root of the plant uses its reserves in order to feed its bud which provides a flower and produces

seeds. In order to obtain an endive, the producer stops this process at the end of the first phase and gathers the roots.



<u>Table 2</u> : The localisation of endive production in the Nord-Pas de Calais and Picardie Regions

We have decided to assess the transport of endive in the Nord Pas de Calais region. There are three main reasons to this choice :

- The first one comes from elements obtained in our primary investigations. We noticed that endive is a regulated product, with many structures which rule its organisation and development.
- The second point takes into account quantitative aspects. The Nord Pas de Calais region is the first world wide producer in endive (83% of world wide production), Belgium is the first world wide consumer, and the Netherlands is the exporter in the world. These elements favour a comparative approach between the three countries.
- The third one comes from the multiple evolutions in endive production and distribution.

The transport of endive is carried out by lorries. There are two kinds of service : the first one concerns the collecting, it means the carriage of endive from the producers to the co-operative plat-form. The second one covers the transport from the wholesaler (often the co-operative) to the consignee. All these aspects and evolutions could give a different definition of the output and outcome of the transport. We thus define two distinct periods of time : 1980-90 and 1990-00, when the ways of producing and distributing were different :

- the 1980-90 period, which is characterised by a real evolution in the production process. We can notice the development of hydroponic systems of production appeared at the end of the 1970's. This innovation led to a massive production of endive and an increase in the part of France (table 4).
- The 1990-00 is the second one that we observe. It's characterised by a regular production all year long, and the apparition of refrigerators in farms which enable to control the production according to the evolution of prices. As the production keeps on increasing in France, we notice that the number of producers fall. They were about 5000 in 1979, 3600 in 1988, and 1500 in 1997.
- This evolution leads to a move from Nord-Pas de Calais region to the Picardie region where the number of producers is not important (300 in 1998) but the production is equivalent to the one in Pas de Calais (70000 ton), but higher than in the North : 55000 ton in 1998). The biggest endive farms are in Picardie.

According to these points, it appears that the "institutional devices" changed. In 1996, the "sale by auction" system vanished, in order to establish a "person to person" system, more suitable with the new methods of production and distribution. In Belgium, both systems coexist. In the Netherlands, more and more producers trade directly with expedition companies, in order to reduce costs.

We could also add the new configurations in organisation (the creation of the "Organisations of Producers" in France resulting from the Common Market Organisation decisions), which may lead to a new definition of performance in transport.

On the distribution side, we can notice the apparition of quality norms. The trade mark "Perle du Nord" has been created. It aims at developing high standards of quality in order to provide a homogeneous product to customers. We met people in charge of the "Perle du Nord" marketing plan, they informed us that transport is absolutely not taken into account whatsover and that "Perle du Nord" doesn't actually meet the carriers.

They are not aware of the way the latter work. For example, many packaging systems exist at "Perle du Nord", which could influence transport.

Production in thousands of ton	1961	1971	1981	1991	1997*
France	135	180	160	180	235
Belgium	90	140	80	100	80
Netherlands	25	30	40	90	80

Source : AGRESTE (1989) and CELFNORD* (1997)

Table 3 : the production of endive

The buyers of endive are principally hypermarkets (over 3.500 m^2) : 17,6% of the endive production was bought in hypermarkets in 1988, 35,4% in 1998 (CELFNORD, 1998). These big structures could influence the way transport is organised. For example, they require a standard endive with homogenous levels of quality. It should be interesting to understand their objectives of transport with regard to these aspects.

3) Propositions for the following development of the thesis and concluding remarks

We represented in table 4, the links between the sectorial approach and the macro-level in the regulation theory. We believe that the link between the micro level (a specific service as in table 1) and the branch requires the institutional devices represented in a dotted line. We will have to understand the degree of determination between the three actors and the sphere.

We'll try to understand via investigations, what the collective representations are (unions, co-operative units, collective meetings, etc.), and to find the way these representations could be involved in transport, or how they influence the performance of transport. Our first researches provided us with interesting elements about the institutions in the endive branch, and their evolutions. We are beginning to establish the different links between the actors involved in the production of endive, and the way rules and regimentation are made. We will soon meet producers, carriers and consignees in order to analyse output and outcome.

In a theoretical way, this work could give elements on the actions and the development of institutions. Many works try to understand how, for example, the actor takes place in the regulation theory (Billaudot, 1996). Is he constrained by the institutions ? Or is the actor able to change the way norms and rules work in his sphere of life ?



Source : Du Tertre, 1995

<u>Table 4</u> : the regulation representation of the "context"

Billaudot (1996) gives arguments on the motivations of actors. He considers that people can have economic activities, i.e. which takes place in money, but generated by other considerations : political (from the state), domestical (from the family) or symbolical ones (from the law). We could better understand how the objectives of transport emerge. For example, we can see distinctions in France between the endive producers in the North (Nord-Pas de Calais), and the ones from the south side of the territory (Picardie). The former have a "traditional" point of view of their activities : they live in small farms, they don't aim at changing their methods of production ; the latter are organised via big systems of production and own hundreds of acres. They do not have the same logic of working and consideration of the evolution of their farming.

How does this distinction take place ? What are the consequences on transport ? This methodological tool from Billaudot could provide answers. It will then be interesting to compare France, Belgium and the Netherlands.

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