BURKINA FASO
Unité – Progrès – Justice

DELEGATION OF BURKINA FASO

MINISTRY OF TRANSPORT

GENERAL SECRETARIAT

DIRECTORATE GENERAL FOR TRANSPORT
LAND AND SEA

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IMPACT ASSESMENT OF LOADS REDUCTION OF HEAVY VEHICLES

EXECUTIVE SUMMARY

March 2009

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EXECUTIVE SUMMARY

Warning

This document aims to provide an overview of the results of a study on the impact of load reduction for heavy goods vehicles in Burkina Faso. It also presents the conclusions and comments of the study's Steering Committee at various stages of the results presentation. SITRASS has been asked to write this summary for the April 2009 workshop.

The terms of reference of the study were very specific and organized according to the following two main results:

1. *Result 1: Knowledge of the current* ***situation and of probable consequences of regulating the load of heavy goods vehicles***

2. *Result 2:* ***Action Plan***

This executive summary prepared by SITRASS outlines the core content of these two results and provides some recommendations for implementation for each.

ACKNOWLEDGMENTS

This summary is based on a main study conducted by a joint venture of experts. In this context, we have met different people in public administration and in the private sector (trade unions of carriers and drivers, shippers, freight forwarders,...). We are grateful for the time and information they gave us. Special thanks go to the Minister of Transport and the Minister of Infrastructure and Improved access for their personal commitment reflecting the importance the Government of Burkina Faso gives to the crucial problem of truck overloading. We also thank the Director General of Land and Maritime Transport and his collaborators, in particular the Director of Standardization and Control for his close assistance throughout the study. We also thank the members of the Steering Committee for their comments and pertinent remarks, which have improved the quality of the final report. Last but not least, we are very grateful to the Directorate General of Roads, the Burkina Faso Shippers Council, the Directorate General of Customs and the Ministry of Economy and Finance for making data available to us. Funding for this study by the European Union underlines the importance it gives to the problem of the preservation of road assets as a basic condition for sustainable development in Africa. We would like to express our deep appreciation to the Delegation of the European Union in Ouagadougou, particularly the Infrastructure Section for its support, its useful comments, its collaboration and availability.

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This study involved the following experts:

- Alain BONNAFOUS, macro-economist, **Head of Mission**
- Amakoé P. ADOLÉHOUME transport economist, main coordinator of the study
- Patrick CHABANNES expert for axle load
- Pierre-Yves Péguy economist-statistician
- Jean TOGUYENI, road engineer
- Jean Y. TOE, lawyer.

The team has also received support from the following experts :

- Bertin A. OUEDRAOGO administration peer,
- Simplice SOME administration peer,
- Stanislas BAMAS, geographer, specialist for road safety,
- Nathalie CHIAVASSA, administrative support.

Finally, Nicolas OVTRACHT and Valérie THIEBAULT (Laboratory of Transports Economy, Lyon, France) have been enrolled to elaborate the poster for the study.

1. RESULT 1: CURRENT SITUATION AND PROBABLE CONSEQUENCES OF REGULATING THE LOAD THE BURDEN REGULATOF ORY IMPLEMENTATION ON HEAVY GOODS VEHICLES

1.0 Context: road network, haulage vehicles fleet and freight traffic

The Burkina Faso road network has been classified into three categories, namely "classified roads" (15 272 km), "urban roads" (350 km) and "rural tracks" (46 000 km). Paved roads account for less than 20% (exactly 17%) of the "classified roads", while earthen roads account for the largest part (63%).

The condition of classified roads in 2007, including the tarred network, appears to be relatively good with almost 60% in fair condition, and only 4% in bad condition (see Chart 1, Annex 1). It should be observed that the coated network had been substantially deteriorated in 2004 (44% in fair condition) before returning in 2007 to the level of 2003.

The development and maintenance of roads represent a significant financial burden for the country's budget including donor's aid. Data from the Second Transport Sector Program (PST-2) shows that during the 2000-2007 period, Burkina has spent some 773 billion CFA francs[1] on the transport sector (99% of this amount going to the road sector, the rest to rail and air).

The supply and demand for road freight transport are described in Annex 1.

1.1 Problem: the need for additional investigations

Based on the methodology established by the Consultant in his technical offer, it appears that the core problem of the study concerns two issues:

(i) Firstly, to determine the proportion of cargo transported as overloading (**P**);

(ii) (ii) secondly, to know how this proportion of freight will be transported without overload.

We hypothesize that it will be broken into four parts:

- Part P1 for freight carried by vehicles that were not previously working at full capacity before and can thus load the extra freight;
- Part P2 for cargo carried by an existing fleet that will have to increase its mileage;
- Part P3 ensured by a new fleet;
- Part P4 corresponding to a modal shift to rail.

This breakdown of P **(P = P1 + P2 + P3 + P4)** is a considerable economic issue:, according to the relative weight of the parts P1 to P4, the effects on the transport sector and the economy will obviously be quite different.

The quality of the study and its results depend on the reliability of the appreciation of P and its breakdown. The data gathered by the Directorate General of Roads usual weighing campaigns have been particularly valuable. However, during these campaigns empty vehicles are not considered and the data are not exhaustive. In order to establish a national assessment on this basis, short but exhaustive complementary surveys were necessary.

Based on the weighing plan in use at the Directorate General of Roads (DGR), weighing campaign extensions were conducted to ensure the availability of comprehensive weighing

[1] 85% of this amount being donor's aid. The three main donors are the European Union (22%), the African Development Bank (16%) and IDA (15%).

(all trucks, loaded or not) and in both directions. Four main weighing sites were selected (see map No. 1): Zagtouly (RN1), PK20 (N4 Koupéla road) Dakola (Po, Ghana border, RN5), KOLOKO (Bobo - Mali border in the direction of Sikasso, RN8).

In this summary, we will very briefly present some significant results in the field of overloading and its potential damage to roads and their lifespan.

1.2 A level record level of overloading

Recall of UEMOA regulation

In December 2005, UEMOA countries signed a Regulation (Regulation No. 14/2055/CM/UEMOA) on harmonization of standards and procedures for the control of the gauges, weights and axle load of haulage vehicles in the UEMOA Member States. The table below shows permitted weights for haulage vehicles in the whole Union territory.

Table 2: Charges authorized (PTAC) per heavy vehicle (UEMOA).

Description / Classification UEMOA	Silhouette du véhicule									Charges des essieux(T) / UEMOA	Charge maximum (PTC) autorisée (T) / UEMOA	Catégorie de véhicules pour cette étude*
Véhicule à moteur isolé à 2 essieux	O		O							6+12	18	C2
Véhicule à moteur isolé à 3 essieux dont 1 tandem	O		O	O						6+20	26	C3
Véhicule à moteur isolé à 4 essieux et plus	O		O	O	O					6+25	31	C4
Remorque à 2 essieux			O		O					6 + 12	18	R2
Remorque à 3 essieux dont 1 tandem			O		O	O				6 + 18	24	R3
Véhicules articulés à 3 essieux simples	O		O		O					6+12+12	30	SR3
Véhicules articulés à 4 essieux	O		O		O	O				6 + 12 + 20	38	SR4
Véhicules articulés à 4 essieux	O		O	O		O				6+20+12	38	SR4
Véhicules articulés à 5 essieux avec un tridem	O		O		O	O	O			6 + 12 + 25	43	SR51
Véhicules articulés à 5 essieux avec deux tandems	O		O	O		O	O			6+ 20+20	46	SR52
Véhicules articulés à 6 essieux et plus	O		O	O		O	O	O		6 + 20 + 25	51	SR6
Train routier et train double à 4 essieux simples	O		O		O		O				38	C2+R2
Train routier (porteur+remorque) et train double, à 5 essieux	O		O	O		O		O			44	C3+R2/C2+R3

* C=camion, R=remorque, SR=semi-remorque.

Weighing investigations give the following results in terms of overload compared to this regulation:

Table 3: Level of overloading (in the most overloaded direction)

	% overload	average % overload	Maximum axle load (t)	Maximum loaded (t)	vehicle class (axle Max)	transported goods	Country of registration + loaded vehicle
RN5	84	52	30	142	SR6	Tôle	Ghana
RN1	47	41	28	141	SR7	Fer	Ghana
RN4	74	38	27	104	SR6	Maïs	Togo
RN8	58	43	22	94	SR4	Sardines	Burkina

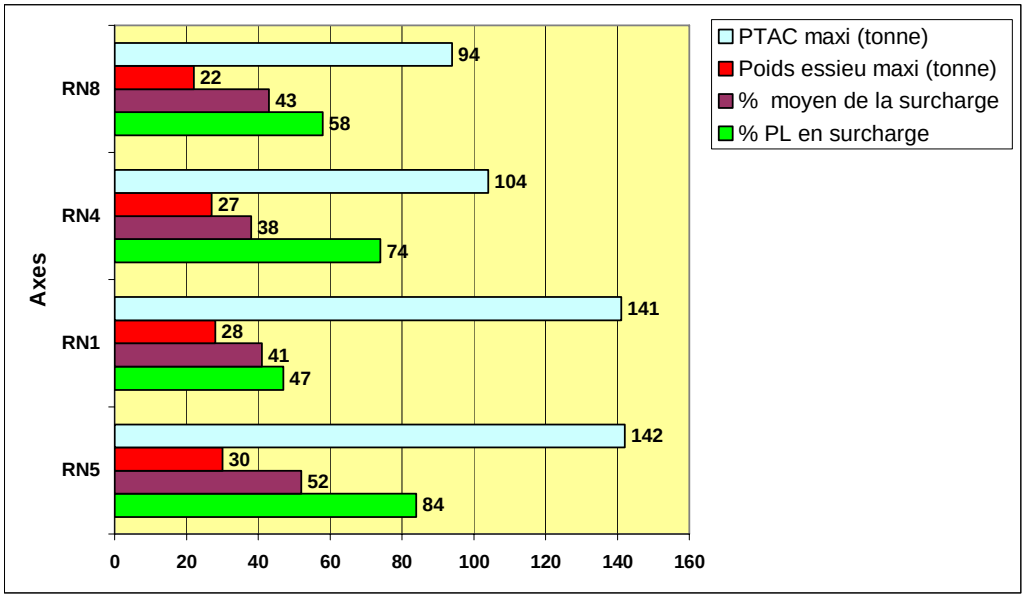
Source: SITRASS-Consia-Beste Engineering, 2007-2008

The percentage of overloaded vehicles for roads RN8 and RN1 is between 47% and 58%, and for RN4 and RN5, between 74% and 84%. The average rate of overload above UEMOA standards on roads RN1, RN8 and RN4 is between 38% and 43%, and for RN5, 62%. For both criteria RN5 presents the highest rates. For all four roads, the South--> North direction is the most prominent.

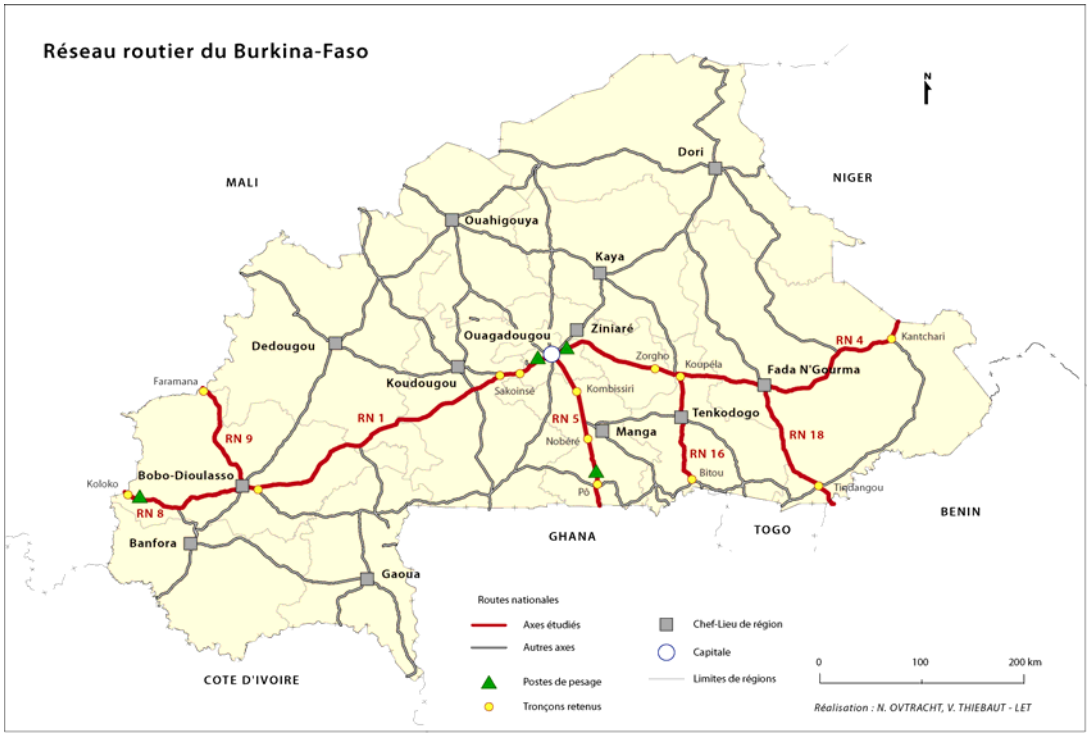
Generally speaking, the most critical loads concern ferrous metals and packed food products (sugar, cans). On RN5 for example, the average overload for sugar is 123 tones for the average profile of 6-axle articulated vehicle combinations.

The RN18 (Benin road) seems to have a particular profile: traffic focuses on oil products and 72% of overloaded vehicles on this road are oil tankers.

Figure 4: Level of overweight (meaning the most prominent)



Source: SITRASS-Consia-Beste Engineering, 2007-2008



1.3 An extremely high damage factor

Following the weighing campaigns, the damage factor of each type of hauling vehicle was calculated for the most overloaded direction of each road. These calculations determine the lifespan of roads, compared to the envisage 15 year life span.

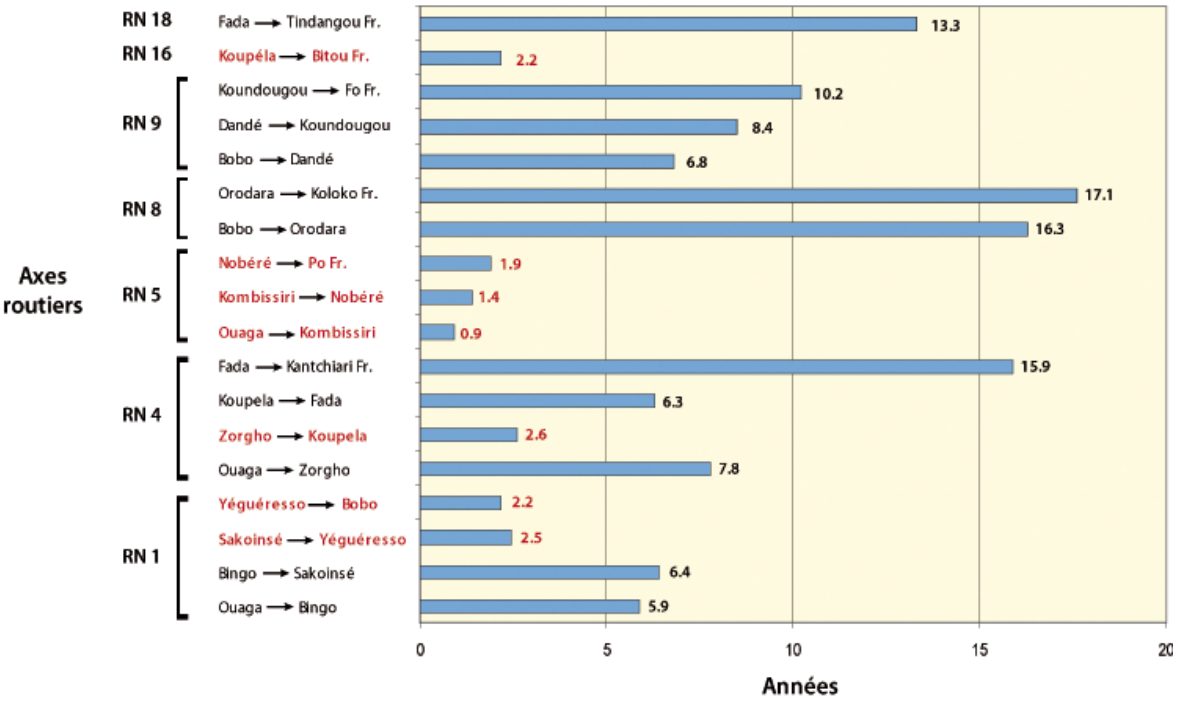
To summarize, the network can be divided according to three levels of damage factor.

- A "**normal**" level corresponding to the lifetime originally planned (15): 448 km on a total of 1 454 km, i.e. **30%** of the network studied.
- An "**average**" level with lifespan ranging from 6 to 10 years : 367 km, i.e. **26%** of the network **----> worrying situation.**
- A "**critical**" level with life expectancy between 1 and 4 years: 639 km i.e. **44%** of the network **----> Critical situation.**

1.4 A significantly reduced lifespan for roads

Due to levels of the damage factor detailed above, the lifespan of the different road sections analyzed are described in the chart below. It should be noted that these roads were initially built for a lifetime of 15 years.

Figure 3: Lifetime of pavements with the current overload



Source: SITRASS - Consia-Beste Engineering, 2007-2008

The calculations also show that when enforcing UEMOA rules, most sections would have a lifespan equal to or greater than 15 years.

If the UEMOA regulation were respected, the investment required to maintain the level of road service would be at a minimum.

1.5 The financial impact of the overloading on roads

The first observation to be made from the table below is the extended life of roads, far beyond 15 years if complying with UEMOA regulation. In fact, some sections of roads under "UEMOA traffic", would have their life increased more than sixfold. In these circumstances, there would be no early deterioration of roads and only"classical" road maintenance would be required.

Table 4: UEMOA regulation and maintenance costs of infrastructure (roads and structures)

SECTIONS	KM	Average daily traffic / PL	Lifetime (years)	periods of 15 years	Total Cost in FCFA	Annual Cost FCFA
OUAGA / BINGO	25	528	57,44	3,83	42 860 509 886	746 226 411
BINGO / SAKOINSE	34	392	59,97	4,00	60 863 053 284	1 014 867 919
SAKOINSE / YEGUERESSO	280	330	15,20	1,01	127 030 520 306	8 357 735 804
YEGUERESSO / BOBO	15	423	20,86	1,39	9 338 327 285	447 735 847
OUAGA / ZORGO	106	469	41,79	2,79	132 223 013 009	3 163 999 983
ZORGO / KOUPELA	30	442	14,70	0,98	13 162 887 424	895 471 693
KOUPELA / FADA	81	226	27,21	1,81	36 007 710 274	1 323 264 373
FADA / KANTCHARI / FR.NIGER	171	108	96,81	6,45	270 437 821 065	2 793 558 121
OUAGA / KOMBISSIRI	40	404	11,99	0,80	14 313 666 362	1 193 962 258
KOMBISSIRI / NOBERE	60	233	18,40	1,23	18 031 886 752	980 195 832
NOBERE / PO FR./ GHANA	64	161	24,61	1,64	25 728 305 123	1 045 542 221
BOBO / ORODARA	76	119	96,82	6,45	120 215 844 180	1 241 581 387
ORODARA / KOLOKO / FR.MALI	54	98	99,58	6,64	87 844 355 890	882 176 249
BOBO / DANDE	55	203	39,93	2,66	35 875 515 089	898 512 846
DANDE / KOUNDOUGOU	20	145	48,84	3,26	15 955 991 263	326 731 944
KOUNDOUGOU / FO FR.MALI	46	82	57,55	3,84	43 249 009 174	751 483 471
KOUPELA / BITOU / FR. TOGO	150	297	14,98	1,00	36 697 234 109	2 450 489 580
FADA / TINDANGOU / FR.BENIN	147	102	58,85	3,92	141 329 872 438	2 401 479 788
				TOTAL	**1 231 165 522 913**	
				ANNUAL / COST	**30 915 015 727**	

Source: SITRASS - Consia-Beste Engineering, 2007-2008

- **Financial consequences**

The annual cost of approx. 31 billion CFA francs noted in the table above refers to the maintenance cost of the 18 selected sections, in the case of compliance with UEMOA regulation (sound situation). This amount should be compared with that of 61 billion CFA francs representing the cost with overloading observed for the same 18 sections.

Finally, the additional cost due to overloading is 30 billion CFA francs per year. For the tarred network considered in our calculations (1 450 km), this represents approx. 21 million CFA francs per year per kilometer. This figure shows the overall positive effect that could be expected should overloading in Burkina Faso be eradicated.

1.6 The micro-economic Impact

The consequences of enforcing the rules on truck load at microeconomic level can be divided into different points. Before addressing these, let us briefly review what has been detailed in the final report on prices and transport costs of goods in Burkina Faso.

1.6.1 The prices and cost of haulage

1.6.1.1Transport rates in steady decline

Haulage in Burkina experiences a crisis characterized by an "excess" of supply compared to the demand for freight. Import channels for used vehicles have developed since the 80s and there is now a very excessive stock of vehicles particularly at the sub regional level[2]. This excess of supply leads to a steady decline in the freight price. The observation over twenty years shows that the prices per tone-km are now at the same level as in the late 80s.

Table 5: Evolution of the carriage of general cargo per tone-km (Lomé-Ouagadougou)

year	Price to the t-km
1988	26,3 - 28,6 F CFA*
1995	25 - 32 F CFA**
2007	26 – 28 F CFA***

Sources:

* A. Adoléhoume Policies for reducing trucking costs, 1992
** SITRASS, transport chain and competitiveness, June 1996
*** SITRASS, field surveys from carriers, Jan-Feb. 2008

These price levels are particularly low when compared to the costs borne by the carriers, taking into account the effect of the 50% devaluation of the CFA in January 1994 and the inflation effect: this signifies that at constant prices, freight transport prices have dropped while the costs of production of the inputs increased.

Given these transport prices, the market should logically lead to a new balance with the disappearance of the less profitable vehicles. However, this adaptation did not take place due to the very small number of people willing to leave the sector. In spite of an aging fleet (the average age of semi-trailers is nearly 20 years!), the oldest vehicles are somehow maintained. The sector overall operates in a **logic of survival** and not in a **logic of development.**

The most damaging component of this logic of survival is overloading, which appears as a **response from the carrier to the low price of freight.** To be compared to the 51 tons maximum permitted for circulating total weight (articulated vehicle combinations with 6 axles and more), loads exceeding 70 tones or 80 are common practice (a 142-ton vehicle has even been recorded). Besides the catastrophic consequences on the state of roads, **this practice clearly increases the supply-demand imbalance and prohibits an adjustment to the equilibrium price:** instead of leading to a

[2] We are talking about sub-regional level by including country parks surrounding coastal!

contraction of supply, lower prices induce overloading and an increase in supply. An imbalance process is thus **self-maintained.**

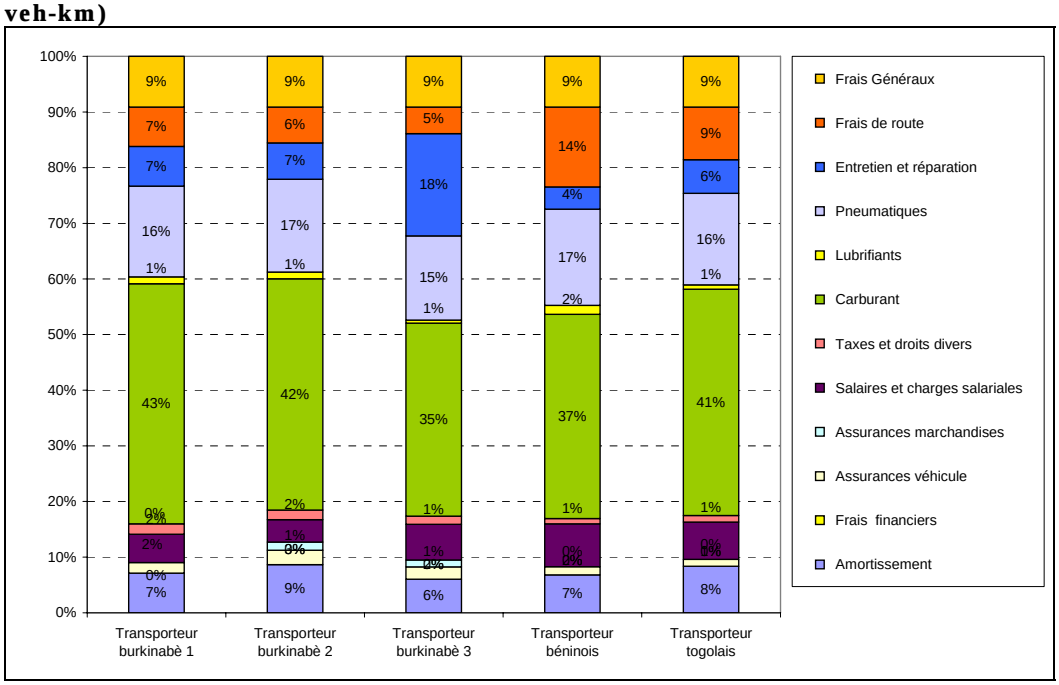
1.6.1.2 Transportation costs

On the basis of our investigations it is possible to establish a relatively homogeneous vehicle operating cost structure between different kinds of carriers (artisans, organized carriers, carriers by nationality ...). For various of cases, we compared the following operating conditions of a 5-axle[3] vehicle with a formal theoretical payload of 32 tons (close to what UEMOA regulation allows). The calculation is done with two overload assumptions: 40 and 45 tons. In each case, we consider the average loading rates for a go and return journey and the number of turnarounds per year.

The operating costs of vehicles of three different nationalities (Benin, Burkina Faso and Togo) are compared in this table, as well as three options for the case of Burkina Faso.

Burkina	*Carrier 1*: truck empty from the hinterland to the coast, average loading rate of 50%, 63% and 70%. Route Burkina - Togo / Benin
	Carrier 2: freight from the hinterland to the coast 7 times out of 12, average loading rate of 69%, 81% and 88%. Route Burkina – Togo
	Carrier 3: small structured company. Freight from the hinterland to the coast 7 times out of 12. Average loading rate of 69%, 81% and 88%. Route Burkina - Ghana / Togo
Benin	freight from the hinterland to the coast 1 time out of 3 . Average rates of 66%, 73% and 80%. 18 turnarounds in the year.
Togo	approx. 18 turnarounds per year but systematically empty from the hinterland to the coast. Average rates of 50%, 63% and 70%. Contract with a shipper with more profitable rates.

Figure 4: Structure on operating costs detailed by nationality of the carrier (% of total cost per veh-km)



[3] 4-axle vehicles (figure 1, 1, 2) are now increasingly replaced by 5 axles (figure 1, 2, 2, or 1, 1, 3) for capacity issues.

Table 6: Operating Costs vehicle-kilometers in 2007 and the average t-rolled km (CFA)

	carrier 1 Burkina	carrier 2 Burkina	carrier 3 Burkina	carrier Bénin	carrier Togo
Fixed costs					
Depreciation	51,22	62,37	37,78	39,77	46,20
Car Insurance	13,41	18,66	13,89	8,84	6,86
Goods Insurance	0	10,45	7,78	0	0
wages	36,59	29,10	40	44,98	37,27
Charges	13,41	12,31	9,17	5,45	6,52
Total fixed costs	***114,63***	***132,89***	***108,61***	***99,04***	***96,85***
Variable costs					
Fuel	308,94	299,39	217,15	215	225
Lubricants	8,75	8,75	3,2	9,50	4,24
Tires	116,67	120,15	94,81	101,01	91,10
Repair and Maintenance	51,22	47,01	115,00	23,48	33,35
Road costs	50,85	46,68	30,00	84,09	52,52
Total variable costs	***536,43***	***521,98***	***460,16***	***433,08***	***406,20***
Management costs	65,11	65,49	56,88	53,21	50,30
Operating cost to the vehicle-km	**716,17**	**720 ,36**	**625,65**	**585,34**	**553,35**
Cost to the t-km					
(loading to 32 tones)	44,76	32,82	28,34	27,71	34,58
(loading to 40 tones)	35,81	27,96	24,14	25,06	27,67
(loading to 45 tones)	31,83	25,58	22,22	22,86	24,59
(loading to 58 tones)	24,70	19,75	17,15	17,42	19,00
Average income (CFA F / t-km rolled)	**28,00**	**32,70**	**36,00**	**31,60**	**33,00**

Considering real costs will highlight a profitability problem in the sector. Most carriers seem to operate below cost. The sector operates according to a logic of survival in the very short term, taking into account only the immediate costs (fuel, wages, road costs).

1.6.2 Assessment of the effect on transport rates

Assuming that the measures taken effectively prohibit any overloading and that the current overload is broken down in four parts P1 to P4 as explained in §1.1, we have shown that for a given level of ton.km, vehicle.km will increase by about 15%. This has a double macro-economic effect: on one hand an increase in the value added generated by the road transport sector, together with job creation, and on the other hand a transport price increase.

This transport price increase will result from two distinct phenomenon: the first one is a mechanical supply effect due to the carrier's, which are artificially lowered by overloading and will increase in due proportion after its banning. The second phenomenon is a demand effect due to the fact that in any market, a 15% increase in demand can only lead to higher prices. Of course, these effects do not add up but can lead to an equilibrium price slightly higher than what would result from a cost increase alone. We distinguish these two effects below.

1.6.2.1 Effect of supply on transport costs

We have tried to calculate this effect in two ways: on the one hand, with a micro-economic approach based on the operating accounts of Burkinabe's carriers that we were able to reformulate (see the preceding table "Operating costs for the vehicle-km in 2007), and on the other hand with a more "macroscopic" approach based on our assessment of vehicle-km induced by the banning of overload.

Both estimates of the effect of supply on prices are very close and amount to no more than about 15%.

1.6.2.2 Effect of demand on the price of transport

In the specific case of road freight, the situations in sub-Saharan Africa is that of a "buyer's market" meaning that a structural excess of supply allows the consumer to play with competition and relatively master prices. It is reasonable to assume that the expected increase in demand will change it for some time into a "supplier's market" and that price increases could exceed cost increases. A **maximum increase of transport fares by 20%** can be assumed.

1.6.3 Possible Intermodal transfers (road to rail)

In our hypothesis of a complete eradication of overloading, as already explained in §1.1, the current overload would be divided into four parts:

- Part P1 : for freight carried by vehicles that were not previously working at full capacity before and can thus load extra freight;
- Part P2 for cargo carried by an existing fleet used more intensively;
- Part P3 requiring an increase in the fleet;
- Part P4 freight transferred to rail.

Table 7: The reports of overcharging and their main effects

overload shares	P1 (capacity)	P2 (Useful)	P3 (new fleet)	P4 (rail)
Effect on road	Unchanged	Unchanged	Unchanged	reduce
Effect vehicle/km road	Unchanged	fullness	fullness	reduce
Effect on road costs	Slightly changed	increased	increased	Slightly changed
Effect on sector's value added	Slightly changed	increased	increased	Slightly changed
estimated ratio « up »				
(± 80 % of traffic)	10 %	60 %	20 %	10 %
estimated ratio « down »				
(± 20 % of traffic)	90 %	10 %	0 %	0 %

1.7 Macro-economic consequences of changes in transport rates

The assessment of the impacts of changes in transport prices was done with a macro-economic simulation model performed with IPA (Automated Estimate Instrument) over the period 2008-2010[4].
We selected a reference scenario on the basis of the key assumptions on oil prices, the major exchange rates, the level of taxation ... in use for the macro economic frame of Burkina for the period 2008-2011. This scenario is complemented by a variant including simulated changes in transport prices.

This amplitude of variation is defined on the basis of a variation of P2 (more intensive use of vehicles) + P3 (acquiring a new fleet of vehicles) of 15% plus a demand effect estimated to 5%. As explained, the banning of any overload would induce around 20% increase in freight price. Accordingly, calculations have been made with an increase of 10%, 20% and 30%.

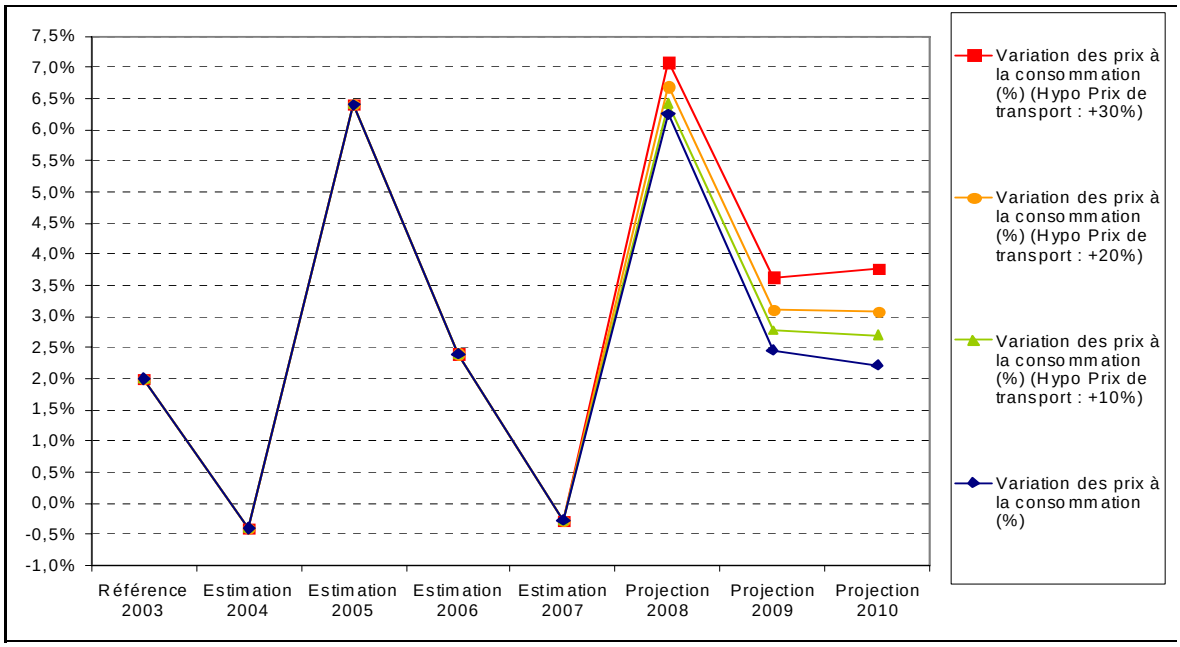
Several indicators need special attention: the price level, economic growth, public finance and poverty.

1.7.1 Consequences in terms of rates

There are slight differences in final consumer prices between the reference scenario and scenarios relating to changes in transport price (10%, 20% and 30% increase):

- for a +10% variation in transport price, the added increase of consumer prices would be around 0.2% in 2008 and 0.5% in 2010;
- for a +30% variation, the added increase would be around 0.9% in 2008 and 1.6% in 2010.

[4] The model developed in the 90s by the German cooperation agency GTZ has been entrusted with the administration of Burkina Faso in particular Ministry of Economy and Finance, which is used in the preparation of the Law Finance and negotiations with donors.



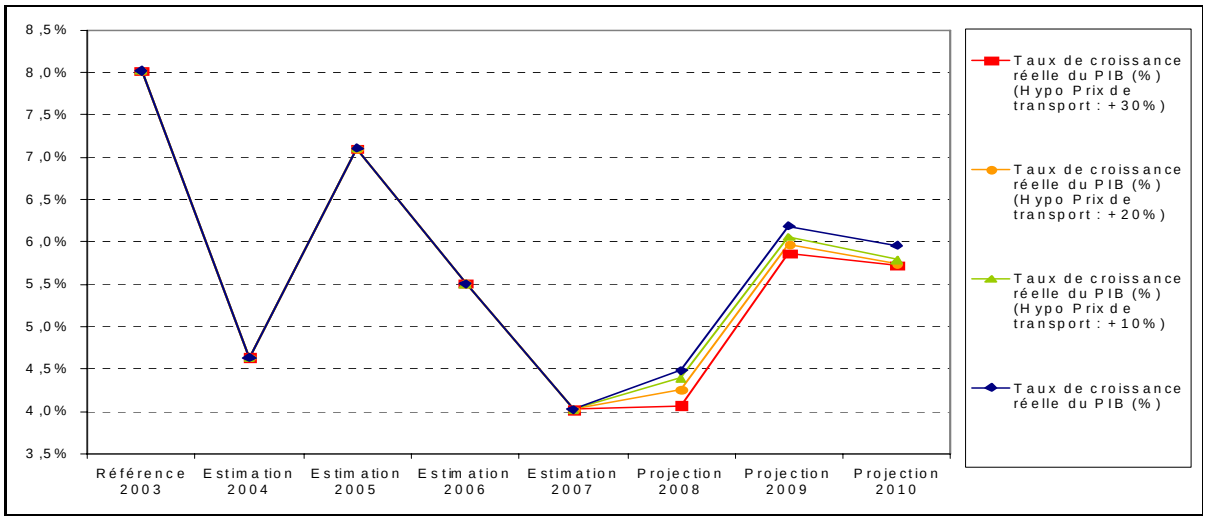
1.7.2 Consequences in terms of GDP

The growing rate of real GDP remains at a level above 4% in 2008 and reached almost 6% in 2010 regardless of the assumptions.

There are small variations of economic growth between the reference scenario and scenarios relating to changes in transport price (10%, 20% and 30% increase). GDP would be reduced from 0.1 percentage points in 2008 and 0.2 percent in 2010 on the assumption of a growth of 10% of freight rates. It would fall by 0.4 percentage points in 2008 and 0.3 percentage points in 2010 assuming a variation of transport rates of +30%. Compared to GDP at market prices of 2008 (3,600 billion CFA F), the reduction would range from 3.6 to 14.4 billion for the negative GDP variations of 0.1 and 0.4 percentage points.

At this level, it is usefull to recall that the additive cost of pavement damage related to overloading is estimated to 30 billion CFA francs, which is higher than the reduction in GDP induced by in increase of transport rates.

In addition, given the absence of a detailed modeling of the transport industry in the IAP model, this simulation does not consider the positive impact on GDP induced by the growth in vehicle-km (P2) and the increase of the fleet (P3).



1.7.3 Consequences in terms of public finances

For the modeling of public finances in the automated estimate instrument (IPA) only broad masses of income are considered. Detailed topics such as tax revenues from the transport sector are not available.

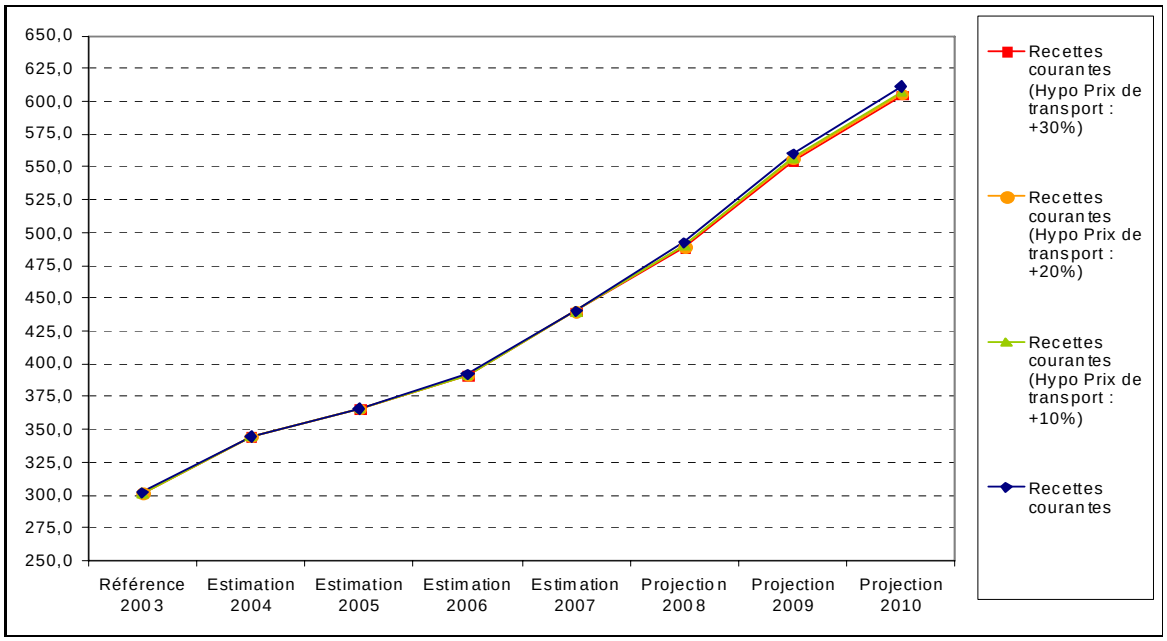
Current income is the sum of tax revenue, non-tax income and capital income. It accounts for the greatest part of Budget revenue and nearly 70% of total State income including grants. Tax revenue stand for more than 90% of current income. It is composed of income taxes, labor taxes, taxes on real estate, on goods and services and on international trade, the latter including in particular taxes on petroleum products.

According to the various scenarios of changes in transport rates, the current income would very slightly decrease:

- an increase of 10% in transport rates causes a current income decrease of 2 billion francs CFA in 2008 and 4 billion CFA francs in 2010;
- an increase of 30% in transport rates causes a current income decrease of 3.7 billion francs CFA in 2008 and 6.5 billion CFA francs in 2010.

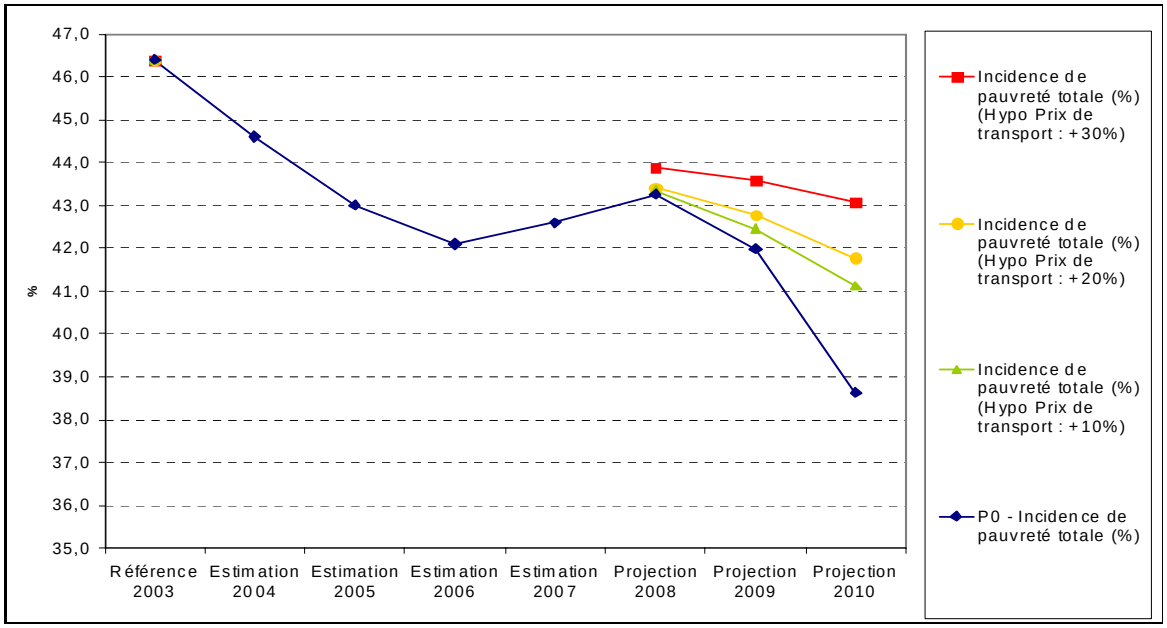
In relative terms, the impact on current income is between 0.4% and 1.1% of the total.

As in the case of the impact on GDP, given the absence of a detailed modeling of the transport industry in the IAP model, the possible positive impacts on the public finances induced by the growth in vehicle use (P2) and the fleet (P3)are not taken into account in this simulation. Moreover, those two parameters in turn generate an increase in consumption of fuel, goods and services which are respectively subject to taxes on petroleum products and VAT.



1.7.4 Consequences in terms of poverty

The rise of transport prices does not affect the decreasing trend of total poverty assessed in the reference scenario, but it slows it down. With no variation of transport rates, total poverty is estimated to 43% in 2008 and 38.6% (4.4 percentage points decline) in 2010. Assuming an increase of 10% of freight rates, total poverty would represent 41% of the population in 2010 i.e. a decrease of only 2 points. In the case of an increase of 30% of freight rates, total poverty would decline by less than one point in 2010.



As for rural poverty, the trend is slowed without being reversed. Being currently higher than total poverty (49.5% against 43% for the general population), in the reference scenario rural poverty should decline to reach 46.4%. Poverty reduction would be 2.4 points in the event of an increase in transport prices by 10% and 1.1 point in the case of a variation of 30%.

The consequences of changes in transport rates differ in the case of urban poverty. It is lower than total poverty (20% against 43% for the total population), but would undergo an upsurge in case of rising prices.

As in previous cases, given the absence of a detailed modeling of the transport industry in the IAP model, the possible positive impacts on poverty induced by the growth in vehicle use (P2) and the fleet (P3) are not taken into account: they will generate additional income for drivers and apprentices whose number of trips increases, for drivers and apprentices newly employed to face the increase in the number of vehicles and for services related to goods transport (maintenance, repair ...).

1.8 Conclusion: "price effect" versus "volume effect" and macro-economic simulations

This simulation of what might be called the "price effect" on growth should clearly be supplemented by what can be called the "volume effect". Our assessment of the likely increase of the haulage activity is around 15%, which is probably a minimum considering that Burkina Faso vehicle fleet could retrieve part of the services currently provided by foreign operators whose competitiveness is based primarily on extremely high overloading.

Yet, the available macroeconomic model cannot simulate the effects of such a final demand. On the basis of the available data, the estimated direct effect of this demand on GDP growth is + 0.15%. Taking into account inter-sectors cross-multiplying, it is reasonable to assume that the overall effect on GDP growth would be between 0.3 and 0.4%. Thefore we consider that the added opposite consequences of the "price effect" and the "volume effect" on growth should be neutral.

As a result, the simulations on poverty in turn should show a neutral effect when taking into account the reasonable assumption of a balance between the effects of the removal of overload on GDP. However, we made an estimation of the “price effect” alone, in order to provide the national authorities with appreciation of the magnitudes involved, and to highlight the differences between urban and rural populations who would not be similarly affected.

Overall, the impacts of changes in transport prices due to the banning of overloading are as follows:

- An inflation of around 1 percentage point compared to the reference scenario i.e. without taking measures to reduce overloading,
- An overall neutral effect on GDP growth,
- An overall neutral effect on total poverty in the country,
- Positive impact on public finances with growth in income,
- An overall positive effect of 30 billion CFA francs on the value of national highways

2. RESULT 2 : ACTION PLAN

2.1 A practicable system

2.1.1 Preliminary Choices

Our final report presents our appreciation of the stakeholders behavior, indeed illegal and ruinous to the community, but rational, to start with those carriers who overload their trucks. Our conclusion is that the right answer would be a mechanism letting no economic advantage to overloading.

However, the detailed analysis of the weighing campaigns shows that on the Burkina Faso road network, overloading is not only a national phenomenon. Indeed the worst offenses (and therefore the worst damages) are committed mainly by foreign operators (Ghanaian usually, and Malian with some tankers).

Therefore to be the most effective, the policy has to be coordinated at sub-region level, or possibly by major corridor on the basis of bilateral or trilateral conventions. Otherwise, at least a minimum coordination will be needed, particularly with regard to information, because there is no doubt about the consequences of holding dozens of overloaded vehicles at a weighing post close to the border. In our scenario for the following proposals, it is assumed that Burkina Faso set up an action plan of its own, yet taking into consideration the UEMOA / CEDEAO resolutions and the having necessary consultations with neighboring countries as explained further.

Another initial choice has to be made between a progressive implementation of the control or the immediate law enforcement only preceded by a strong information campaign. This choice of course does not belong to the experts. In what follows, for convenience of presentation, it is assumed that the system becomes immediately operative.

The first aim of the mechanism to be implemented, backed by strong political resolution, is to establish an economic frame that breaks down the domino effect described in detail in the final report.

2.1.2 Minimum economic conditions

First of all, the amount of the penalization must be such that the carrier is convinced that he will have a net loss in case of overloading.

This "penalization" is obviously a combination of a clear value (the fine and immobilization costs for the goods and vehicle) and of the probability of being punished. This obviously refers to two conditions: on one hand that the amount of the fine provided by regulations be established at the right level, and on the other hand that the probability not to escape punishment be high.

The only difficulty for the first condition is technical: checking that for different levels of overloading, the fine income covers the social costs of the offense and, mainly, that the cost for the offender is higher in probability that the advantage deriving from overloading.

It is clear that in the reasoning of the carrier, the cost is closely related to the probability of being punished. The collective interest implies that this probability should be as close as possible to 100% once the offense is committed. This of course refers to the second condition and the effectiveness of repression and control.

To reach such efficiency any moral hazard in the control and repression system has to be completely prevented. This calls for a mechanism guaranteeing that the control agent has

an undeniable interest to enforce law and, on the contrary, be certain to lose his job if he lets an overloaded vehicle pass by. This implies two conditions:

that the function of control - repression is carried out as part of a public service delegation properly remunerated but revocable at any failure to comply;

that the scheme is complemented by a light and mobile squad of "controllers of the controllers" only qualified to operate outside weighing stations to verify that vehicles complies with the rules (no overload or overload tolerated but a fine paid).

2.2 Problems of acceptability and transition

The problem of acceptability arises at multiple levels, starting at international level since it concerns primarily the transport on the major international corridors.

2.2.1 International dimension

It is necessary to consider this dimension, as it is also a question of acceptability. It would certainly be inefficient to create tensions between countries and even counterproductive if the measures used were to be withdrawn because of the reactions of the neighbor. The results already achieved in our study constitute a decisive argument to convince neighbors of the benefits of an initiative of Burkina Faso and to justify the support of UEMOA (or CEDEAO) and donors.

On international corridors, special attention should be paid to the weighing systems in the ports (and in the main sites emitting heavy freight such as cement or iron products factories, ...). Indeed the majority of the trucks circulating in Burkina Faso have their origin (or destination) in the ports of the sub region, particularly in Abidjan, Tema / Takoradi, Lome and Cotonou. Weighing stations installed at the main ports gates should be used to enforce regulations on overloading and should abide all requirements in terms of resources, devices, types of scales, computers and software and of maintenance.

It is important that an intense information campaign be launched several weeks before the introduction of the control and repression system, depicting the cost of overloading to the country[5] and the punishment scale together with the prohibition thresholds. If the international consultation has been properly prepared, this information should be given all along the road. It should directly involve professional stakeholders as well as local radio and television.

It should be noted that the international dimension could be the best protection for the public authorities concerned against the reactions of various pressure groups. It would obviously be desirable to present this as an international protocol and a conditionality of funding by donors.

2.2.2 Economic dimension

The level of offense is such that the return to a normal situation can create formidable problems for carriers. Following our statistical and accounting analysis, we now have a clear idea of the new production costs and prices of road transport that could result from a situation without overloading.

[5] This would imply that having accurate and reliable data on the costs of damage from overloading for each countrie of the sub region g. A study based on the methodology used in the case of Burkina Faso but limited to one aspect of the cost of damage should be conducted in the countries of the sub region or, alternatively, the magnitude we came up with for Burkina Faso could be adapted on a proportional basis.

We have seen that the transport costs could be significantly higher than current costs and that this increase could be around 15% on average. No one can imagine that carriers could go on selling their services to the same conditions. Shippers should be aware of the inevitable adjustment in transport prices that could reach, at most, around 20%.

Whatsoever, the 20% mentioned above could well not be reached, for carriers should benefit at least two cost decrease factors. The first is an increase in vehicle-km for a given vehicle fleet, allowing a bigger lowering of fixed costs (relative to vehicle-km) than we have estimated. Secondly, the load control should be seen as a full discharge and must lead to the suppression of the various forms of "illegal tolls". If the administration succeeds in ensuring that full discharge character on the roads concerned, it may save significant time and money.

A third factor lowering costs will be the gradual improvement of the road network, but effects will show only over time.

Indeed the real core issue is the transition towards a new balance of costs and prices in the road transport sector**, no longer based on the puncture on national wealth resulting from overloading.**

2.2.3 Compensatory measures?

2.2.3.1 "Price effect" versus "volume effect" and acceptability

Assuming that the eradication of overloading will be successful, we have seen that its impact on the national economy as a whole, through an increase in real prices of transport of 20% or less, would be relatively limited. The additional inflation will not be very visible and the loss of growth will be the more symbolic that the macro-economic simulations did not take into account the increase (about 15%) in vehicle-km produced by the sector, which will create jobs and added value.

Such a policy should not bring problems of acceptability from the population, especially if the possibilities of improving and developing the road network are explained. It may be different for carriers, particularly for those who live on overloading and will undoubtedly have to assume additional costs, i.e. to transform them into price increase.

We have seen that by a strong and sudden increase in demand, the demand effect should push up the prices a bit beyond cost increases. But occasionally, a carrier may have difficulty with his shippers and, especially, there may be major concerns in this regard before the effective implementation of new balances.

2.2.3.2 Reorganization measures within the sector

In our final report we have mentioned a series of measures that should be discouraged, mainly those that would have a windfall effect and could also be ruinous for the public budget (e.g. reduction of fuel taxes for haulage vehicles). In terms of accompanying measures, targeted actions towards specific operators should therefore be considered. Tracks to be studied are, in particular:

- Subsidized loans for the purchase of efficient vehicles (purchase required to ensure part P3 of the overload);
- A guarantee of free movement without additional control (and without "illegal toll") for vehicles having passed the weighing control (with the exception of the "control of control" which should not be frequent);
- A several year commitment of the Government towards the carriers to ensure the quality level and proper maintenance of a particular route in the network;

- A reduction in specific taxes, for example on insurance.

Such commitments together with other measures still to be imagined and the commitment of carriers to comply with the permitted loads, could be recorded in a **"contract for progress"** between the government and the carriers.

Some of these proposals are detailed below.

2.2.3.2.1 Potential for fleet renewal

One of the core questions of sustainability of the transport sector is its capability to "regenerate", i.e. to ensure fleet renewal. This is its main difficulty. Figures from the Ministry of Transport (DGTTM) are significant: in 2006, 74% of the semi-trailers in Burkina Faso were over 20 years old!

Considering the ability for vehicles to retrieve their own value through their cash flow, the difficulties of the sector are obvious. Where the return is true, it is largely achieved through the economy of capital (used vehicles), which is necessarily at the expense of safety and environment (overload, maintenance ...).

Therefore, it is legitimate to promote the introduction of new vehicles. Calculations show that it is "impossible" to secure the financing of new vehicles by traditional bank financing, the payback periods on investment being too far from what can be considered as the requirements of operators. The operators[6] we interviewed in the course of the study gave the following reasons to this lack of resort to bank credit:

- - Too high interest rates
- - Short deadlines
- - Lack of access to credit (frequently),
- Lack of need for credit.

The last two answers refer to a few facts that actually make resort to banks difficult, if not useless:

- The absence of clear accounts that can be considered by banks,
- The acquisition of used vehicles which do not fall within the scope of bank loans,
- The low cost of used vehicles which can be bought without a loan,
- Finally, an insufficient financial base given the amount of credit necessary to buy a new vehicle.

In the case of Burkina Faso, attempts have been made in the past with State support in order to encourage the renewal of the fleet of vehicles with financial measures, but all have led to mixed results. Despite the State gift on import taxes, new vehicles remain too expensive in the current functioning of the sector. Operators could not consider conventional bank financing (at market conditions): the financing conditions exert too much pressure (repayment too short and high interest rates) on investors.

In these conditions, the introduction of subsidized financing may be a way to pass round the obstacle and reconcile a costly investment and a requirement of rapid payback of the capital. We conducted a simulation of a subsidized financing (interest rates reduced and extended term of the loan):

Assumptions

[6] In particular artisan carriers

- *Interest rate*: 5% instead of the usual 15% commercial rate

- *Duration of loans*: 5 years instead of 3 years usually in force

- *Purchase price of vehicles*: vehicles manufactured in China under foreign license (Volvo and Mercedes). This type of vehicles adapted to African conditions costs about 66 million CFA francs including taxes (semi-trailer 5-axle type). We assume the contribution from the operator to be 25% of the vehicle; hence the amount to borrow is about 50 million CFA francs.

- *Number of vehicles concerned:* we have estimated a high (very optimistic) hypothesis of 1 000 vehicles i.e. nearly 20% of the fleet currently in circulation.

Simulation Results

- The simulations indicate that the cost of loans is about 15 billion CFA francs (10 percentage points in interest rates) for 1000 vehicles (11 billion CFA francs if the vehicles are purchased free of taxes).

- The purchase of vehicles costing 66 million CFA francs including taxes with a loan of 50 million CFA with an interest rate of 5% over a period of 5 years, however, corresponds to a monthly repayment of 944 000 CFAF (708 000 CFAF purchase free of taxes). This seems unrealistic under the current conditions of operation of the sector: with one turnaround per month, this amount corresponds roughly to monthly sales of the operator, after deducting the road and toll costs but not counting the fuel!

- Based on the assumptions, to make it possible to repay the loan operators must do at least 2.5 turnarounds per month. This will not only ensure the monthly payments but also to guarantee a rate of return and a payback of capital almost acceptable[7].

The simulation described below focuses on the ability of a vehicle to generate cash and to ensure its on return flow, but not on the capability of a company - possibly with several vehicles - to promote its financial equilibrium with the renewal of its equipment. Uniform measures should therefore be avoided. Such measures definitely give better results with transport companies with several vehicles. Some kind of premium should thus be given in relation to the size of the company, encouraging structured transport companies owning several vehicles, which may have a less precarious financial balance and a more reliable performance than artisans, or even worse, owners of a single vehicle. This loans system should also be an opportunity to encourage operators to unite in the form of economic interest groups. Thus, a minimum number of vehicles in the range of 10 to 20 (or more depending on the final plan to be set up) for each economic interest groups (EIG) would contribute to the restructuring of the sector, at time characterized by high fragmentation.

To ensure reimbursement, a kind of joint guarantee fund could also be established (this makes the members of the EIG stand together). For example, a levy of 3% on monthly reimbursement may abound this guarantee fund. But it will increase monthly payments and therefore reduce the profitability of the operation for investors.

Special attention has to be given to the risk of windfall effects of such measures if the problem is not address in a comprehensive manner. Indeed, an interesting offer is likely to trigger renewal and improvement of the park, followed by a step back to previous ways of doing, once the measure has stopped. The impact of a financial imput should therefore not

[7] Even with a discretionary flows of 1.3 million CFA francs per month (which is difficult to achieve), it will take7 years to recover all the capital employed!

be overvalued. Good financing terms often allow new behaviors, but seldom cause radical transformations. This means that these measures should be part of a global plan.

The mere availability of P3 freight would not be sufficient to ensure the 2.5 turnarounds per month necessary for a sufficient rate of return and payback for investors. Thus a comprehensive program has to be settled, beginning with the guarantee of market transparency (access to the cargo) and the success of the facilitation program implemented by UEMOA.

Table 8: Type of financing and profitability parameters

	Present case, commercial rate, 3 years	**Purchase TTC interest rate, 5 years**	**Purchase HT, interest rate, 5 years**
Borrowed capital (CFA F)	50 000 000	50 000 000	37 500 000
Self contribution	16 000 000	16 000 000	12 500 000
Annual rate	15,00%	5,00%	5,00%
Month rate	1,25%	0,42%	0,42%
Duration months	36	60	60
Monthly instalments	1 733 000	944 000	708 000
Annual financing wage	20 799 000	11 323 000	8 492 000
Discretionary monthly flow	*1 300 000*	*1 300 000*	*1 300 000*
Discretionary annual flow	15 600 000	15 600 000	15 600 000
Duration of loans	60	60	60
Month loans	1 733 000	944 000	708 000
Annual wage	20 799 000	11 323 000	8 492 000
Net cash available after annual burden of financing	-5 199 000	4 277 000	7 108 000
Value of capital at beginning of period	66 000 000	66 000 000	50 000 000
Rate of return	-7,88%	6,48%	14,22%
Payback on capital employed (years)	not significant	15,4	7,0

Source: Sitrass, 2008

2.2.3.2.2 Market transparency and access to freight

Improved market transparency should be sought. A better knowledge of the operating conditions of the sector must be guaranteed by the DGTTM (or better by Burkina Faso Shippers Council, CBC) in the matters of service, traffic and freight prices, which will certainly require the establishment of an electronic dashboard and a good collaboration within the profession. Carriers and drivers Unions must be able to inform their members on the minimum price to cover their actual costs. To this end, at least a few permanent staff of those unions should be trained.

A precise knowledge of import and export freight should be sought. The comparison of data from the Customs and the CBC on import traffic shows significant differences that could not be adequately explained by the two agencies (see Volume 2.2). The CBC should improve its data collection system, and work closer with the Customs by comparing periodic data[8].

The market transparency also requires the removal of barriers for access to freight: distribution rule 2 / 3 - 1 / 3 (or 50 - 50) between Burkinabe and coastal carriers, and of the turn system managed by unions. In the facts the quota rule has fallen into disuse. It only benefits to a few individuals, and penalizes operators who seek to modernize and professionalize their activities. The turn system only draws the sector down and prevents its true professionalization.

2.2.3.2.3 Facilitation measures and free movement

The main problem repeatedly raised by the carriers for years back focuses on obstruction to the traffic on inter-state roads, causing significant financial and time losses. The latest report of the West Africa Trade Center (WATH)[9] is particularly instructive. Based on surveys conducted on the Tema-Ouagadougou-Bamako Ouagadougou and Lome-Ouagadougou road sections, three points were evaluated: number of roadblocks, amounts of illegal taxes collected and loss of time. Depending on the different sections:

- The number of roadblocks is 1 to 4.6 per 100 km (4.6 for the Ouaga Bamako section)
- Illegal amounts range from 1 632 to 12 294 CFA francs per 100 km (the highest in Mali and the lowest in Togo)
- Time loss is estimated between 15 and 38 minutes for 100 km (15 minutes in Burkina Faso and 38 minutes in Mali).

This phenomenon is obviously not recent[10] but it is time to display a strong political at the sub regional level to overcome it. Happily it is taken into account in the Regional Facilitation Project set up by ECOWAS and UEMOA with the support of the European Union. Its eradication not only means financial and time gain on the corridors but also determines the success of other measures essential to the functioning of the sector. Of all the measures we have mentioned, this one is certainly not the easiest to implement, if only because of social pressure of the beneficiaries of road blocking.

2.3 Location, management and operation of weighing stations

Measures to be put in place to control the overload are not detailed in this summary, as only technical problems (easy to overcome) have to be addressed.

Based on the results of the exhaustive weighing campaigns, it is proposed that the most vulnerable road sections be equipped with weighing facilities.

[8] Even if the objectives of both organizations are not the same, such differences for the volumes of freight in the same country raise serious questions.

[9] WATH, Report on the first results of the Observatory of abnormal practices (OPA) on the main Inter-State Road, Accra, July 2007. http://www.watradehub.com/accra

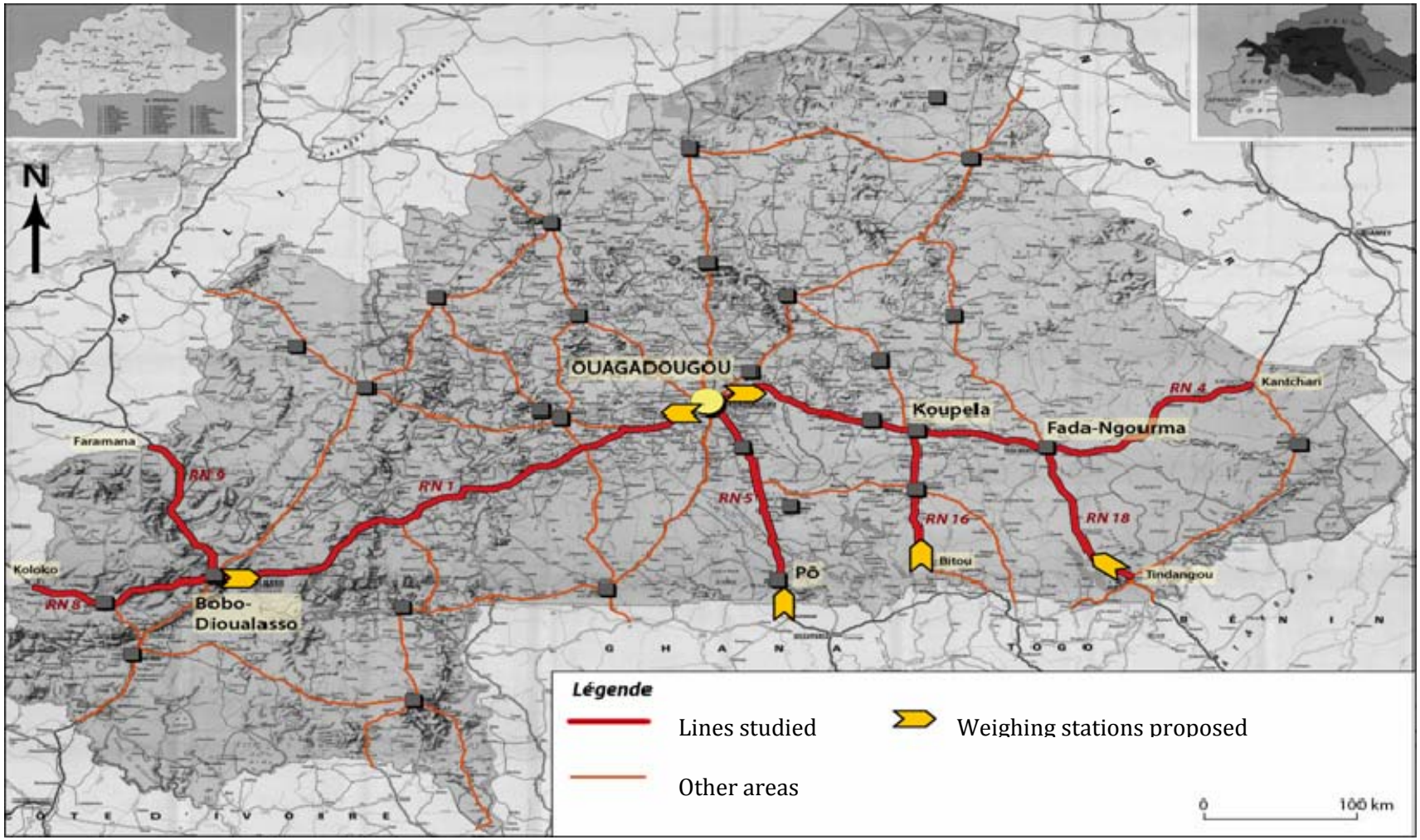
[10] cf. conclusions of the seminar in Yamoussoukro SITRASS 1 November 1989. *"Policy to reduce trucking costs in sub-Saharan Africa: Cameroon, Côte d'Ivoire, Mali, Togo."*

The need to take into account the international dimension in the control of overloading and in particular the treatment of the problem at source, ie in ports has already been detailed. The port facilities will be much lighter than those established inside Burkina Faso in terms of infrastructures (no parking for overloaded vehicles, no goods storage area etc.).

In addition to this international dimension, it is recommended that burkinabe weighing stations be installed on Burkina Fasos territory as follows (see Map No. 2):

- Two stations around Ouagadougou, one in Zagtouli (Ouaga-Bobo route) and the other to the east of Ouagadougou on the road to Koupéla;
- One out of Bobo-Dioulasso (Bobo-Ouaga direction);
- One on RN5 frontier Ghana (Ghana-Burkina direction);
- One in Bittou, border of Togo (Togo and Burkina direction);
- One in Tindangou, border of Benin (Benin-Burkina direction).

These six stations will form a security line for haulage in Burkina Faso.


N
OUAGADOUGOU
Koupela
Fada-Ngourma
Kantchari
Faramana
Koloko
Bobo-
Dioualasso
Pô
Bitou
Tindangou
RN 4
RN 5
RN 1
RN 16
RN 18
G H A N A
T O G O
B É N I N
Légende
Lines studied
Other areas
Weighing stations proposed
0
100 km

ANNEX 1: Supply and demand for transport

The offer for road freight accounts for approximately 35% of the total vehicles in Burkina Faso (Table 1). In the scope of this study, the vans are not taken into account because they rather provide domestic transport of goods in small quantities; the fleet of heavy vehicles (trucks, tractors, trailers, trailers) accounts for 19% of the total in 2006.

The main observation that can be done in Table 1 is the sharp increase in the trucks fleet for the period 2001-2006: 80% for trucks, 114% for tractors, 38% for trailers and 113% for semi-trailers. This increase is mainly due to the outbreak of the Ivorian crisis in September 2002, which at times interrupted rail traffic (between September 2002 and December 2003) and delayed traffic between Burkina and Côte d'Ivoire mainly on road corridors of Togo and Ghana. Finally, Figure 2 shows that the fleet of trucks is very old with an average age of about 18 years.

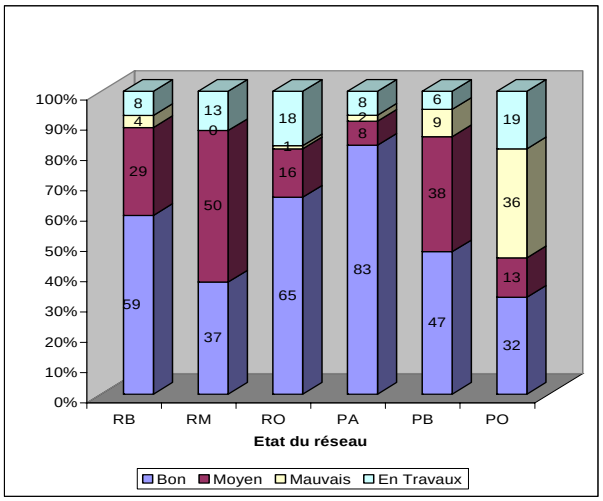
The demand for transport is mainly carried out by the road as shown in Figure 3. According to the Directorate General of Customs (DGD), exports and imports have increased overall between 2000 and 2007. We also note the fall in rail traffic on the peak of the Ivorian crisis (including 2003), this traffic has been transferred to the road corridors of Togo and Ghana in particular.

Table 1: Evolution of the car park (2001-2006)

Description	2001	2002	2003	2004	2005	2006
Trucks	14 184	15 621	16 378	18 046	20 136	25 183
Lorries	7 652	8 697	9 482	10 863	12 461	13 842
Tractors	3 947	4 521	5 662	7 049	8 152	8 464
Trailers	177	180	199	199	209	245
Semi trailers	3 614	4 193	5 062	6 359	7 431	7 697
Total good vehicles	29 574	33 212	36 783	42 516	48 389	55 431
Private cars	53 983	61 639	67 034	74 842	84 161	95 913
Special vehicles	283	306	348	441	534	912
Others	392	411	244	251	278	351
Passengers vehicles	4 098	4 506	4 672	5 120	5 664	6 547
Total transport of persons and other	58 756	66 862	72 298	80 654	90 637	103 723
Total fleet	**88 330**	**100 074**	**109 081**	**123 170**	**139 026**	**159 154**
% Freight transport /total fleet	**33 %**	**33 %**	**34 %**	**35 %**	**35 %**	**35 %**

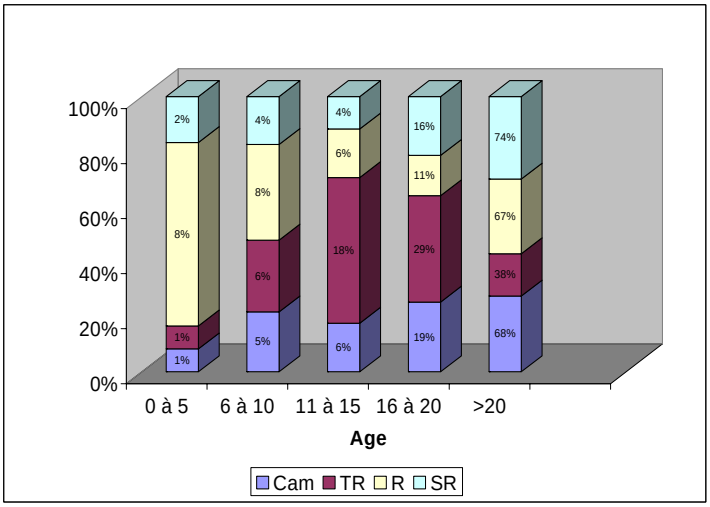
Source DGTTM, 2007

Figure 1: Network status (2007)



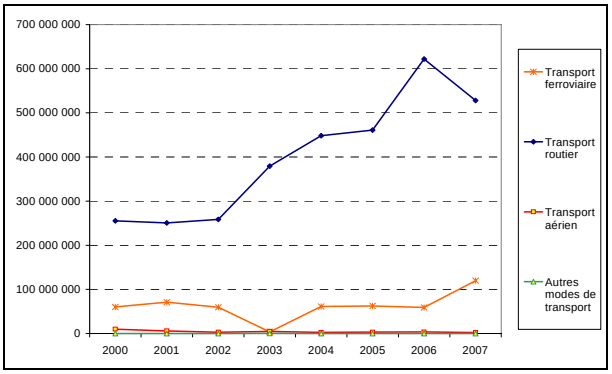
Source : DGR, 2007

Figure 2: Age of fleet trucks

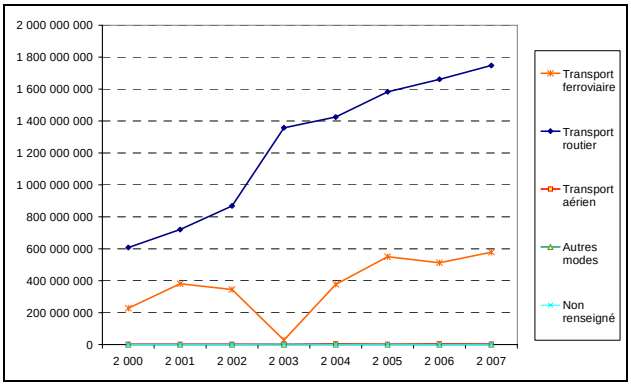


Cam (camion), TR (tracteur-routier), R (remorque), SR (semi-remorque)
Source : DGTTM, 2007

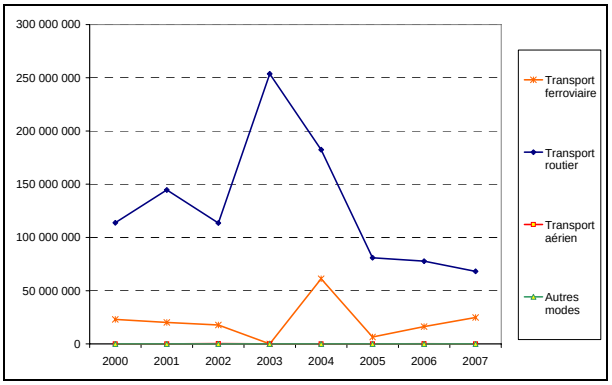
Figure 3: Evolution of freight traffic by mode of transport (source: DGD)



Exportations (kg)



Importations (kg)



Transit (kg)

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