

MINIMIZING TRAFFIC NUISANCE (IN CITIES) BY OPTIMIZATION OF LOGISTICS AND MEANS OF TRANSPORT

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SUMMARY

Any distribution company in our economic system will seek to optimize its logistics and means of transport. However, the solution to the optimization problem may be influenced by external parties. Naturally one can think of the company's image in the eyes of the public, its customers. Many times however, the government will act against traffic nuisance, either on behalf of the citizens or for other e.g. political reasons.

Both stimuli will cause adjustments in the company's distribution system through internalization of a priori external effects.

Ahold being a large distribution company in The Netherlands, it will be shown what ways it follows towards performing its role in society. As a matter of course this will begin with the requirements of the retail outlets, being the places where it ultimately meets its customers. A picture will be drawn of the current infrastructure and the methods and means by which it fulfills those requirements. Without ignoring the possible influence of individuals in society, we will then concentrate on government action against traffic nuisance. A number of measures will be mentioned and their possible effects analyzed. Special attention will be drawn to the fact that there appears to be no concerted action of local governments, which is rather confusing to a nationally operating company. Under the influence of these measures one may choose from a limited number of reactions and thus come towards an adapted distribution policy. The possibilities will be shown with their respective effects. Also other considerations and restrictions will be taken into account. More specifically attention will be paid to actual plans to combine the physical distribution of currently separately handled product groups.

1. Introduction

It is only logical that a distribution company in our economic system will seek to optimize its logistics and means of transport. My company Ahold, a large food distributor in the Netherlands with an annual turnover of some f 8 billion in this country and equally substantial interests in the USA, is no exception.

Basically our task is to distribute our goods as close to the consumer as she appreciates. (I use the word "she" because most of our customers appear to be women). Currently we distribute chiefly via retailoutlets with either a neighbourhood or regional function. This function highly determines the size and composition of the range of products. But also for a number of years we have been experimenting with a distribution system that delivers the desired products to the customer's home.

Operating within the economic system that we know, we naturally have profitability as a starting point or, if you prefer, as a precondition. This means that we must keep a watchful eye on both revenues and costs. Marketconditions are close to what economists call perfect competition, so that prices have largely lost their relation to costs and are mainly determined by value as perceived by the individual consumer.

The implication is that it is practically impossible to pass on any extra costs to the consumer, unless she appreciates the added value or all our competitors do the same. An extra complication in this respect is that we do not apply price differentiation by geographic location. If we did it would mean that all customers would have to pay for those that are living in less accessible areas. This leads us to the question whether a company like ours can be expected to design a policy towards minimizing traffic nuisance. Unless it hampers us in performing our job, we can see no reason to do so. Naturally we are aware of the fact that our distribution system generates traffic and therefore causes nuisance like noise, pollution and congestion. But if it does not specifically affect our image in the eyes of the public and does not, for that reason, lead to a loss in revenue, we may not be tempted to adjustments that generate extra costs.

And this is where the government, principally being the representative of the public at large, comes into the picture. Of course the people in government may have other, for instance political, reasons to intervene with the process of distribution but here we shall refrain from other motives than those that are in the interest of the citizens. So the government, be it local, regional or national, will act upon obvious external effects of us fulfilling our role in society. Whatever means it may apply, the end will always be to internalize these external effects into the company's profit and loss account. In some instances levies and taxes are appropriate but also on many occasions measures are taken that indirectly cause our costs to rise.

We shall now have a short look at what sort of a company Ahold really is, what distribution system it applies in the Netherlands and which variables can be manipulated to optimize logistics and the means of transport. We will then concentrate on a selected number of government actions against traffic nuisance and their possible effects. Subsequently I will look at the possible reactions upon these measures and more specifically at actual plans to adapt the distribution system to new circumstances. Last but not least I will try to answer the question of what the government could do for us.

2. Ahold: a large food distributor in the Netherlands

By far the largest part of our Dutch operation is the Albert Heijn supermarket chain with an annual turnover of some f 7 billion through more than 550 retail outlets. Grootverbruik Ahold is specialized in supplying institutional customers like hospitals and company restaurants and has a growing turnover of now f 700 million a year. Our specialty stores Etos (health and beauty aids) and Gall & Gall (wine and spirits) generate annual sales of respectively f 210 million and f 350 million through some 150 and 270 outlets. In addition to the retail trade we operate a food production and packaging company (Marvelo), a processed-meat company (Meester) and a bakery (Albro) as well as a few other, more or less experimental, ventures.

Focusing on the Albert Heijn supermarkets we see that they are spread all over the country, albeit with a relative concentration in the Western part. A little more than 450 are wholly owned by us and some 106 are operated under franchise contract. Sales areas vary between under 100 square meters to over 4,000 square meters, but two-thirds of them you will find to have a surface of between 500 and 1,500 square meters. From a sales point of view many of the stores really should be larger than they are, but simply do not have enough room to expand.

Replenishment of the Albert Heijn stores takes place from 3 regional warehouses for fast moving groceries and perishable products (together some 2,300 lines), 4 meat processing plants, 5 agricultural produce centers and 1 nationally operating warehouse with some 6,000 medium and slow moving articles. Deliveries are made within 24-36 hours after ordering and with frequencies of 3-6 times a

week from each distribution center. Altogether more than 220 billion cases, crates and boxes are handled each year or on average some 4.3 million a week, the equivalent of approximately 3,000 average truck-loads. In addition to that we have direct deliveries from suppliers and contract-distribution by third parties. The relative volume shares in 1988 of each channel by product category can be shown as follows:

Product category	Own distribution	Contract distribution	Direct deliveries
Fresh meat/chicken	60%	-	40%
Produce/flowers	100%	-	-
Groceries	90%	5%	5%
Beers/soft drinks	85%	-	15%
Perishables	95%	-	5%
Fresh bread	-	-	100%
Milk	-	-	100%
Deep frozen	-	100%	-

The first question to be asked in (re)designing a physical distribution system ought to be: what is it the stores require to be able to perform their task i.e. serving the customer as close to her house as she values. Customer demand (and suppliers' push) has caused the range of products and the volume of sales to grow steadily over the years. To make this possible the stores required more and more sales area and where space was short anyway, this trend made backrooms diminish. Thus in-house stocks grew smaller and smaller, while at the same time more and more fresh products entered the range. Since the customer expects a full and neat store that invites her to shop around pleasantly the frequency of deliveries had to rise.

We have seen that we have a number of separated distribution channels. From each channel arrangements are made with the stores as to ways of ordering, leadtimes, frequencies of delivery, drop volumes and moments of supply (usually time windows). These are all more or less independent variables of the distribution system and can be manipulated. Frequency is of course very much related to drop volume, but there is yet another way of affecting the quantity to be delivered at a certain moment in time. We can either combine or separate groups within the product range or, in fact, determine the number of distribution channels that lead towards the retail outlets.

Last but not least we have a choice in the means of transport. It is hardly a question of whether or not to use lorries, of which traffic laws and physical circumstances limit the range of types and sizes. Economies of scale have led us to the larger types of trailers, carrying either 18 or 26 pallets and swop-bodies with a capacity of 16 plus 14 pallets. The pallets we now use measure 1,000 * 1,200 mm; an alternative could be the Euro-pallet measuring 800 * 1,200 mm, which we do not apply now for reasons of scale, but we may have to do so in future since most European countries do. Another possibility is to use rollcages and we do so for product-groups that are less voluminous.

So much for our current distribution systems. Now let us have a look at where and how we meet (local) government in using them.

3. Government measures and their effects: a selection

Ideally from our business point of view we would expect the government to create an infrastructure that facilitates our physical distribution. However, the government has other interests to watch over as well. Traffic jams are a pain in the neck for every transport operation that requires the use of the road. Pollution of the environment necessitates government to bring the growth of car usage to a halt, partly by maintaining the bottle-necks, thus discouraging (potential) car drivers.

In so doing not only commuters and pensioners are hampered in their freedom of choice and mobility, but also the professional hauliers. It appears to be rather difficult to apply different measures to different groups of road-users. So far only public transport has, in some instances and places, been awarded the advantage of having their own lanes. Nevertheless the share of road-transport in the total national freight movement (measured in tonkilometers), has grown from 66% in 1975 to 71% in 1987, while the average lorry capacity has increased from 8.3 tonnes in 1980 to 8.7 tonnes in 1985.

Most lorries that enter our cities do so for delivery purposes. Unloading time is relatively big in comparison to driving time, especially when full car loads must be discharged. And yet, getting there becomes more and more difficult, because of traffic circulation schemes, parked cars, many times double and/or in prohibited places and obstacles intended to be just that. When finally arrived, the unloading zone is occupied with private cars, possibly owned by customers, or the road must be blocked by the lorry because there is no zone at all. Only recently we came into conflict with a local police force that would no longer allow our lorries to replenish one of our franchising stores. The road leading towards it was said to be unsuitable for that much weight i.e. 10 tonnes of vehicle and up to 20 tonnes of load. This of course may be true enough, but we had been doing so for many years and therefore we claimed to have a right to continue this.

To spare citizens the nuisance of noises caused by engines, electromotors, the clattering of bottles and other disturbing sounds, periods of time have been set, during which no (un)loading is to take place. Usually this is allowed from 07.00 to 19.00 hours only, a period of time being the busiest and largely overlapping opening hours of the store. In addition to this limitations have been set on soundlevels, differentiated by the hours of the day.

A few months ago we found ourselves confronted with quite a difficult problem in the delivery of goods to one of our newly built stores. Some people living and/or working in the direct vicinity of this store used every legal possibility to protect their interests. This resulted in a high court of law deciding upon a strict limitation of sound levels and a time-window for loading and unloading from 0700 hours to 1300 hours only. What made this a problem is the fact that we had to comply in order to be allowed to open the store, while a thorough investigation learned us that actual soundlevels were higher than allowed and that the customary replenishment procedures would not fit the restricted time-window. It took us quite some time and effort to solve the problem, but after all we did.

Earlier I mentioned a general lack of space in our stores. As a result of that returnables are often put down on the sidewalk because there is nowhere else to place them. This however makes them a special target to the environmental police. We have a system that enables for empty bottles to be returned in order not to charge the environment with more waste. Having little space to store them, we are urged to make extra trips to take them away, thereby causing some extra pollution.

The biggest problem appears to be that local Government action seems to lack co-ordination, so that we are confronted with a mess of regulations and prohibitions. This makes it rather difficult to devise a comprehensive and effective policy to meet them.

Nevertheless we shall now consider the possibilities to do so anyway.

4. Changing distribution policies: responses and challenges

The distribution channels leading towards the stores make their delivery agreements independently from one another. One distinctive way to lessen nuisance would be to improve co-ordination between them. More and more we are discovering that the retail outlets and their surroundings are the place from which all thinking and planning should start. In terms of logistics this would mean taking the specific requirements regarding the flow of goods into account when building or remodeling a store. This is only logical: after all a retail outlet is nothing else but a warehouse, dressed up by marketeers. But of course store designers must balance between many, sometimes contradictory or even conflicting, requirements at the same time taking account of all the limitations.

Once the store is in operation in fact it should be the manager himself that devises the delivery plan together with his suppliers. And again there will be conflicting interests often paired with a lack of know-how on the side of the manager, who is expected to be practically omnipotent. Evidently, life for him would be easier if he only had to talk to one organization, instead of having to deal with several suppliers.

Within Albert Heijn we are gradually taking over physical distribution from external parties for this purpose, although we must admit that we have other reasons to do so as well. Also we are planning to integrate distribution channels, at least from a transport point of view. The general idea is to create regional warehouses that contain all fast moving articles, as well as perishables, agricultural produce, fresh meat and frozen food. Of course we must take into account that product characteristics differ, for instance because temperature conditions need to be maintained. Giving each product category its own sector of the warehouse and (variable) compartment in the trailer will mean that this requirement can be taken care of. To illustrate the effect of this we expect the following statement to hold true: a combination of agricultural produce, meat, long life chilled, superfast groceries and frozen food distributed from a composite warehouse to a 150 stores in the Northwest of Holland will require a total of 1,200 deliveries per week, whereas in the current situation 3,450 deliveries are necessary.

Thus the number of trucks arriving at the backdoor of a store would be sharply diminished. However, one must realize that deliveries will be more voluminous and therefore unloading times longer. The quantity of kilometers driven will hardly be affected, although less trips will have to be made between stores, thereby minimizing traffic nuisance in cities.

We expect to have the first composite warehouse in operation by 1992, but already in some places and instances we are required to operate as if we had one now. Our store on Texel, one of the islands in the north of Holland, is being replenished by lorries that combine groceries, long-life chilled goods and produce. Since the goods originate from different locations some regrouping is necessary. The decision to do so was based upon cost saving considerations.

Earlier I spoke about the problem we found ourselves confronted with in opening a new store. Here too regrouping of goods coming from the different warehouses appeared to be the greater part of the solution, even if we had to make some flows to come from other warehouses than they did before.

One might be tempted to think that using smaller vehicles would also reduce traffic nuisance. For the smaller stores this may be true, or more generally speaking, we could strive to having one delivery per trip only, thus reducing interstore traffic to zero. This, however, has two distinct disadvantages for us: 1) having a variety of vehicles in different sizes reduces our flexibility and 2) smaller trucks are relatively more expensive. For instance a capacity of 12 pallets costs almost as much as a 24 pallet load. That is why we cannot simply comply to a local authority demanding us to use smaller vehicles because of the condition of the road.

On a smaller scale of course there are other things that can be done. To lessen noise when loading and unloading more rubber can be applied in the trailers. Manufacturers of mobile equipment can be urged to make less noisy engines and electromotors. When building or remodeling stores we can take more account of changing attitudes towards nuisance and employees can be made more conscious of the environment they work in. And that of course is what we do whenever the occasion asks for it.

5. Minimizing traffic nuisance: what the government can do.

As I said, my company fulfills a role in the Dutch society in distributing food and related products and we expect government to help us doing so. We appreciate the fact that other interests of the people must be watched over as well and we accept the governments pursuit of internalizing the external effects of our activities. Important for us however is that policies are devised and applied consistently throughout the country.

Widening the allowed timeslots would certainly help us a lot, as suggested earlier. After all, during evenings and nights there will be no congestion, neither in the streets nor in the store. But again this is a trade-off with noise and risks of criminal action. Also it would be very helpful if our trucks could use the traffic lanes of public transport. More generally speaking, some help from the government with regard to time windows and free traffic lanes would be very welcome in doing what must be done anyway.