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Negative Effects in Logistic Networks

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Introduction

When certain firms constitute a network they gain advantages of the cooperation in the network. But at the same time they may suffer from several disadvantages and losses inferred by the cooperation, e. g. free rider behaviour.

An individual firm will only continue to cooperate in the network if the advantages exceed the losses.

There is much literature on the relation of advantages to losses in networks.

Negative effects in logistic networks

In my lecture I will focus on negative effects in logistic networks. Furthermore, I will consider logistic network as networks which are constituted by traffic carriers.

It is well known that a strong tendency towards concentration is inherent logistic networks so that regulation agencies had to supervise the carriers in order to guarantee a minimum level of competition under the carriers.

I will specify two cases of logistic networks:
- a hub of an airline on a certain airport
- railway carriers

The economy of hubs

When we consider an airline hub we have to distinguish at least three parties: The airline, the airport and the passengers as the customers of the airport and the airline.

At the hub the airline can collect and consolidate passengers to use the aircraft capacity for a long distance flight. The airline gains certain advantages of the organisation of the hub. These are economies of densities and of scope.

But where are the disadvantages and how are they distributed? The airline suffers from delays of flights. The hub structure implies that this delay propagates throughout the following flights.

The hub structure demands from the airport to build up the infrastructure to the peak demand of the hub time table. So the usage of the infrastructure on the average is low.

The hub structure requires from the passengers to enter an overcrowded airport. A famous example is the “hell of Heathrow”.

Mega Hubs

The airline hubs in Paris, London-Heathrow and Frankfurt developed to “mega hubs” as a heritage of the time of a strong regulated air transport market.

The state owned “flag carriers” Air France, British Airways and Lufthansa had privileges to use the airport capacity as a hub for long distance transport.

Foreign competitors had a strongly restricted access to airport capacity at home. So the absence of competition at home impeded the decentralisation of the mega hubs.

So you can consider the overfilling of the mega hubs as a consequence of the absence of competition.

Slow technical progress in railway networks

The second case of negative network effects is cargo transport in a railway network. You can observe slow technical progress in national railway companies whereas the technical progress in truck transport is rapid. Every year a new generation of trucks is released to the roads incorporating the latest technical progress with a multitude of electronic devices. Why is this not the case for national railway companies? Observers guess that the innovation cycle in railways runs over 20 years.

What are negative effects of the railway networks?

The large amount of cargo wagons means that modernising them causes high costs. So we can observe slow technical progress in the railway transport.

Incremental modernization of small fractions of wagons does not yield substantial improvements until a large fraction of wagons is achieved. So by the network effect, you can only modernise them all in one step or omit modernization at all.

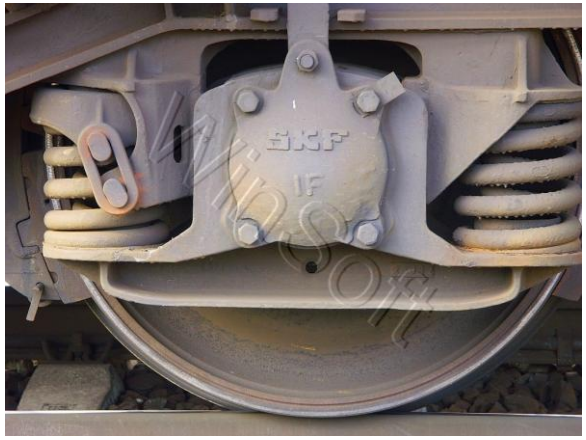
The slow speed of technical progress in train transport differs strongly from the fast technical progress of truck transport. The fleet of trucks does not exhibit network effects. Older trucks drive with new ones on the road network together and they do not disturb each other. Every year a new generation of trucks equipped with the latest electronic devices for control is released from the factory on the road network.

Here are three examples for slow technical progress in the railway transport:

(1) In Germany railway noise is a great issue. In Germany the national railway possesses 130.000 cargo wagons. To fit them out with low noise brakes would require 5 billion Euros. So the decision is postponed.

(2) The same argument applies to GPS systems for cargo wagons which would make it possible to locate an individual wagon in the network.

(3) Since 150 years the principle of cargo transport has not changed: At the top of the train a locomotive, behind the wagons appear. But besides the brakes, there is no control of the wagons at all by the locomotive. So, for example, there is no technical support for controlling the axel boxes of a wagon. While in a truck there are a lot of electronic devices to control the truck, there is no electronic device to control the temperature of the axel boxes in order to detect hot boxes and to prevent major accidents of cargo trains.



Train accident in Viareggio (Italy), June 2009

European Train Control System

The European Commission will introduce the European Train Control System to overcome the national barriers in a European train transport market. In every European country there is a (individual) national system for train control, but the systems do not fit together as a common, European-wide network.

To introduce an European Train Control System in the core net of 75.000 km require investments of 6 billion Euros each year for over 20 years.

If – concerning the quick technical progress in the field of microelectronics – you would decide to introduce the European Train Control System in year 2010, you will achieve the complete European Train Control System in year 2030, but at the price that it incorporates the technological standard of 2010.

Thank you for your attention!

Literatur:
Richard Vahrenkamp: The Logistic Revolution
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