

11 – 16 April 2010

Land Consolidation and Agricultural Traffic - Instrument for Calculating the Traffic Volume

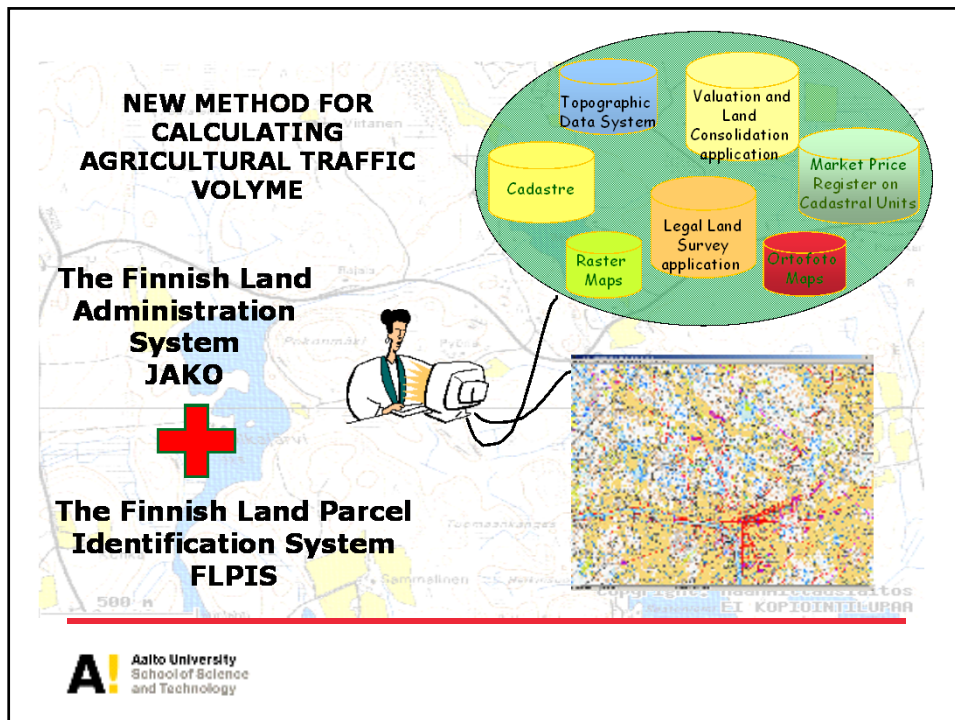
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Finland

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Total area: 338,000 sq. km
Population: 5,3 million inh. (16 inh./sq.km)
Gross domestic product: 32.800 USD per capita

A! Aalto University
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and Technology



A revolutionary structural change took place in the 20th century in the Finnish rural area:

- In the 1940's the share of the rural population was still about a half of the whole population but had decreased to some 10 % by the turn of the century.

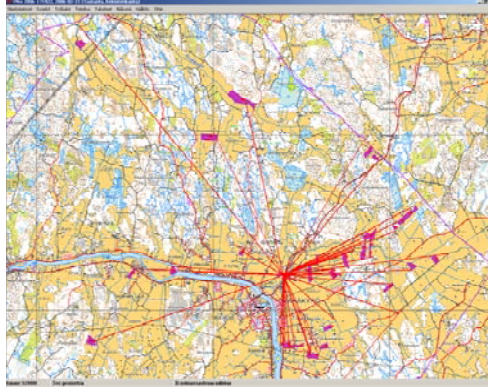
The number of farms was:

- in the 1950's more than 300 000 farms
 - in 1995 ca. 100 000 farms
 - in 2008 ca. 60 000 farms
- In 1995 to 2008 the average size of farms has in fact grown from 22 field hectares to about 35. The share of leased fields in the same period has increased from ca. 22 % to 54 %.

The increase in farm size nearly exclusively seems to take place by the increase in field parcel number and very little by the increase of parcel size.

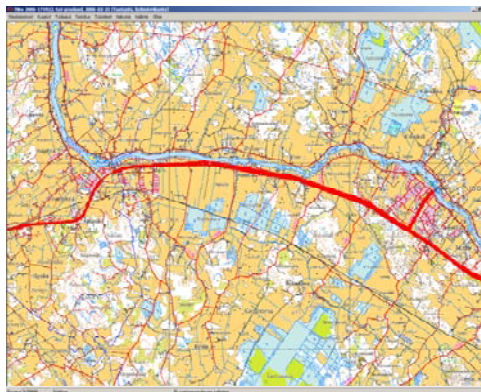
The purchased and especially leased additional parcels are usually further from the farmstead than the fields already used.

Along with the fragmentation of property division the impractical agricultural traffic from the homestead to parcels will increase.



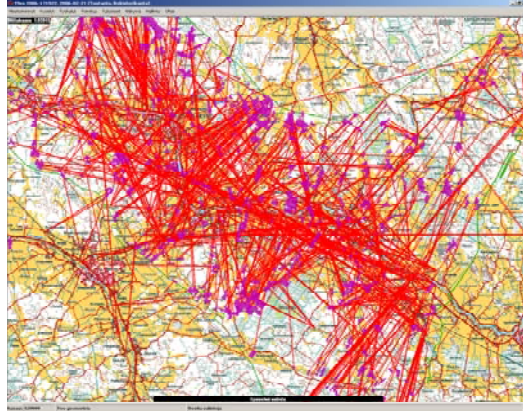
The increase of agricultural traffic on the road network is also seen by the traffic flow, especially in the peak seasons, spring and autumn.

On the highway network this is a problem of traffic safety. When the volume of slow agricultural traffic increases the average speed of the traffic slows down and overtakings substantially increase.



Agricultural traffic on highway 18

THE PROBLEM OF TRAFFIC SAFETY

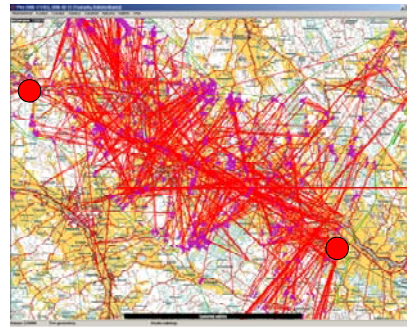


Field parcels located farther than 6 kilometres from the homestead; at least 1 km drive on highway 18.

For analysing the agricultural traffic the volume of agricultural traffic was counted on the highway 18 between Laihia and Ylistaro.

The road distance studied was 29 kilometres and its average daily traffic is 4 800 to 6 600 vehicles/day.

Field parcels requiring traffic on highway 18 at least for one kilometre and located at the minimum distance of six kilometres from the farmstead were chosen from the register and included in the study



The number of travels in the calculation is obtained by the formula (Halonen 2007):

$$k = \sum_{i=1}^n t_i * p_i$$

k = average annual number of travels in the area (number/field parcel)

i = production line (1-n)

t = share of the production line of the agriculture in the area (%)

p = production line specified number of travels per year (number/field parcel)

The volume of agricultural traffic in the area by the formula was 8 travels/parcel/year, on the average ($k = 0,72*8,5 + 0,08*10,8 + 0,11*10,8 + 0,09*1 = 8,262$).

The total volume of agricultural traffic (129 farms) on the studied road section on highway 18 was 35 300 km/year to own field parcels and 21 700 km/year to leased parcels, i.e. 57 000 km/year (440 km/farm/year) in total.

MINIMISATION OF AGRICULTURAL TRAFFIC ON THE MAIN ROAD NETWORK

For calculating the optimal parcel locations the study area formed into production sectors.

A production sector was formed of an area, which was convergent so that it always consisted of field parcels in the range of a road intersecting from the main road



After forming the sectors the field parcels of the farms located in the sector were placed in the same sector where the farmstead was located.

The agricultural traffic on the main road was then calculated in a new situation. Both owned and leased fields were considered.

The outcome of the analysis was that if it was possible to arrange the field parcels in the area absolutely optimally, the volume of agricultural traffic on highway 18 could be reduced with 45 % from the present, i.e. some 26 000 km/year

this will cause annual savings of appr. 25 000 euros to the farmers, which when capitalised (30 years, 5 % interest) means the total savings of 390 000 euros.

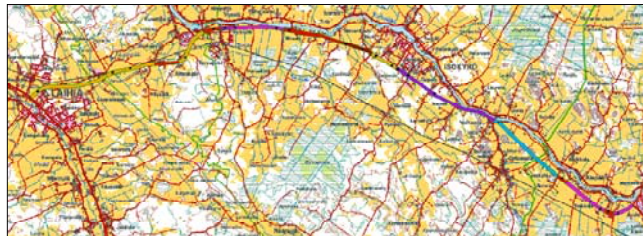
	Kilometres /year at present	Kilometres /year in optimum	Reduction (km)	Reduction (%)
To leased parcels	21 680	12 256	9 424	43 %
To owned parcels	35 248	18 832	16 416	47 %
Total	56 928	31 088	25 840	45 %

+ The benefits for traffic safety

The present agricultural traffic on highway 18, travels/year

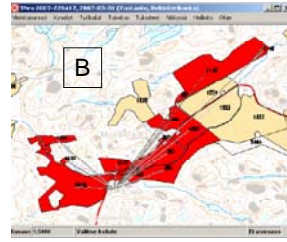
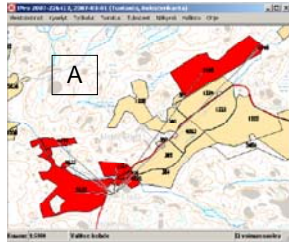
0	199
200	400
401	600
601	800
801	1000
1001	1200

Agricultural traffic on highway 18 in optimal situation, travels/year



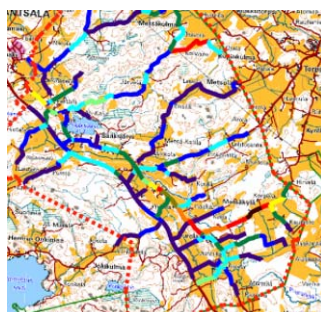
DESCRIPTION OF THE FUTURE CHANGES IN THE AGRICULTURAL TRAFFIC VOLUME ON THE VILLAGE ROAD NETWORK

By means of the route calculation instrument contained in the FLPIS and the JAKO System one can also consider how much the agricultural traffic volume will change in the future on the village (or other area) road network, e.g. when the number of farms decreases or land consolidations change the property division.



Field parcels of a farm today, 6 pcs. (A) and after 5 years, 14 pcs. (B).

THE FUTURE CHANGES IN THE AGRICULTURAL TRAFFIC VOLUME ON THE VILLAGE ROAD NETWORK

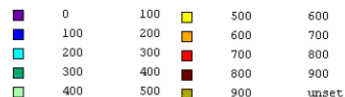


Traffic volume today



Traffic volume after 5 years

Traffic volume, travels/year



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Thank you for you attention !



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