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## Serie Research Memoranda

Network Infrastructure and Regional Development;

A Case Study for North-Holland

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## CONTENTS

1. INTRODUCTION	3
2. INFRASTRUCTURE AND REGIONAL DEVELOPMENT	
3. BACKGROUND	5
4. TRANSPORTATION PLANNING ISSUES IN THE PROVINCE OF NORTH-HOLLAND	6
4.1. Introduction	
4.2. General Provincial Side Conditions	
4.3. Traffic Criteria	7
5. TRANSPORT PROBLEMS	8
5.1. Introduction	
5.2. Development of Traffic on Major Roads	
5.3. Travel Time, Accessibility and Road Safety	9
5.4. Other Determinants of Road Quality	
5.5. Expected Traffic Growth	
5.6. Observations	10
6. SOCIO-ECONOMIC DEVELOPMENT	
6.1. Spatial Structure	
6.2. Population, (Un)employment and Commuting	
6.3. Regional Economic Chances and Challenges	13
6.4. Location Factors	15
6.5. Conclusions on Regional Economic Development	
7. SIX INFRASTRUCTURE SCENARIO'S AND THEIR EFFECTS	16
7.1. Introduction	
7.2. Six Scenario's	
7.3. Other Measures	17
8. CONCLUSION	
REFERENCES	18
CHARTS	21



## 1. INTRODUCTION.

Regional development is not only the result of private production factors such as labour and capital, but also of infrastructure. Improving infrastructure leads to a higher productivity of private production factors. Conversely, a neglect of infrastructure leads to a low productivity of other production factors.

The desired balance between private and public infrastructure has been the subject of much theoretical and ideological debate. Hirschman has pointed out, however, that it is illusory to think that a balanced development is possible. Given the lumpiness of network infrastructure, one will often have relatively long periods of excess supply or demand.

The debate about the contribution of infrastructure to economic development takes place at various spatial levels. In the Netherlands, the regional level has been the main concern until the end of the 1970's. Infrastructure has been a main ingredient of regional policies aiming at reducing interregional disparities. More recently, the attention shifted to the national level since it became clear that investments in infrastructure have declined dramatically in the early 1980's. Severe bottlenecks and degradation of quality can be observed for various types of infrastructure. The international level has been the most recent dimension which is added to the infrastructure debate (see for example the Fourth Memorandum on Physical Planning). The process of economic integration in the EC implies that international competition will become more severe, and that the importance of infrastructure as an immobile location factor will increase.

In this paper we will present a case study on the evaluation of infrastructure projects in a Dutch province (North-Holland). Our qualitative economic impact analysis contains both descriptive and analytical components. Use has been made of the analysis of regional economic statistics, a user survey of local transport entrepreneurs and interviews with local and regional experts.

Before presenting the case study, we will first draw some lessons from the general literature on this subject in order to provide the reader with the necessary background.

## 2. INFRASTRUCTURE AND REGIONAL DEVELOPMENT

The most immediate impact of infrastructure on regional development takes place during the construction phase. The direct and indirect effects (which are only of temporary nature) can be adequately analyzed by means of input-output analysis.

A permanent impact of infrastructure investment usually takes place in the form of operations and maintenance. The size of this impact can be estimated by an analysis of operational rules and practices of the institution controlling the infrastructure.

Another permanent impact of infrastructure, which is much harder to estimate is the so-called programme effect. Programme effects of infrastructure refer to the rise in productivity of other production factors induced by the infrastructure investments. They may also refer to improvement of the locational profile of a region which leads to a higher level of private investment as a result of the improvement of infrastructure. No unique standard method or recipe exists to study programme effects. The existence and size of the effects depend strongly

on a large set of intermediate variables.

A survey of studies on programme effects of infrastructure is given by Van Gent and Nijkamp (1987), and Rietveld (1989). The main findings of these studies will be summarized below.

Infrastructure is a *conditio sine qua non*, but certainly not a sufficient condition for regional development. Infrastructure will only have a positive impact if the region at hand has already a favourable existing potential for new development. The implementation of new infrastructure in an economically weak region may even run the risk that the region at hand suffers from strong competition of firms in more distant regions. Thus, infrastructure has to be considered in relation to the whole locational profile of a region. Further, infrastructure investments will only have a discriminating effect on regional development if the competitive position of a region is enhanced. An important variable co-determining the programme effects of infrastructure is the general economic situation: in the case of a less favourable economic situation, the average size of the programme effect is lower than what would otherwise be the case.

The contribution of infrastructure to regional development depends on its uniqueness. An increase in an abundantly available infrastructure category will not exert a large influence on the regional economy. For example, road expansion in an area with a dense road network will have lower effects than in an underdeveloped area. Infrastructure is subject to decreasing marginal benefits. It is important, therefore to assess the potential effects of new infrastructure types versus existing types (e.g. telecommunications versus roads).

Infrastructure types typically have their life cycles. Life cycles must not be used in a simplistic way, however. Rail traffic for example is now regaining momentum - after a long period of relative, and sometimes absolute decline - by the introduction of high speed trains.

Infrastructure is a multidimensional phenomenon. Both substitution and complementary relationships may exist between various types of infrastructure. Synergetic effects are important, accordingly. Due to a general lack of coherent data sets on investments in infrastructure, such synergy effects are difficult to analyze, however.

The causal relationships between infrastructure and regional development is not clear a priori. It is not necessarily true that infrastructure is an exogenous factor which influences regional development. It may also be the other way around so that government is one of the actors responding to the needs of for infrastructure in an endogenous way. The investigation of such causality relationships is not easy, since the programme effects of infrastructure may only become manifest after a long period.

Improvement of infrastructure gives rise to both distributive and generative effects. Distributive effects refer to a spatial redistribution of economic activity, whereas generative effects refer to the impact on the aggregate economy. There is a clear risk that distributive effects are overlooked or underestimated. This may happen for example when the spatial delimitation of the study area is too narrow. In that case, negative distributive effects - occurring in regions not benefitting from the infrastructure remain unobserved. This obviously leads to an overestimate of the programme effects of investments in infrastructure.

### 3. BACKGROUND.

In this paper the necessity of, the possibilities for and the foreseeable effects on (regional) economic development as a consequence of improving the road (and rail) network(s) in the northern part of the Dutch province of North-Holland are discussed. This part of North-Holland covers three regions, viz., Noord-Kennemerland, West-Friesland, and Kop van Noord-Holland and (the island of) Texel (see map). These regions are separated from the southern parts of the province of North-Holland by means of the Northsea Canal linking Amsterdam with the Northsea. A number of tunnels and ferry-boats are used as connections but their capacity is insufficient to meet demand for transport. This geographical separation is one of the main reasons for the negative locational image that discourages firms to settle in the northern part of North-Holland.

The main focus of the present study is on the economic effects of improving one road - the north-south road T13 between Middenmeer and Hippolytushoef (near the Closing Dike, the so-called Afsluitdijk) - and building a completely new road - the east-west road N23 - between Alkmaar and Hoorn. Constructing the N23 was a topic that was already discussed since the end of the 1960's. This road was meant to serve as an extension of an east-west link between Hoorn and Enkhuizen - in the province of West-Friesland. Alkmaar would then be connected with the eastern part of Holland and West-Germany - a potentially important customer market - by means of high quality motorways.

The evaluation of these new connections did not only include an intensive study of various (official) study reports, but also fieldwork by means of a questionnaire on user views on the quality of the road network, various interviews with regional experts in both transport and economic research, and on site investigation of the road and public transport networks.

The main research questions behind this study were the following:

- (a) In how far is the current economic situation in these three regions related to an unsatisfactory quality of the road network?
- (b) Can an improvement of the quality of the road network upgrade economic potentials and generate economic challenges?

These research issues follow the line of recent interest in the Netherlands (and other West-European countries) regarding the economic importance of a good accessibility of firms by means of well functioning infrastructure networks. Adequate access to customers and suppliers reduces transportation and other costs (viz., storage costs) and will therefore improve competitiveness of commerce and industry, and thereby also improve employment. Congestion on roads on the other hand, leads to serious and very costly waste of time. Time management has become an essential part of modern business management, as so-called Just-in-Time (JIT) management asks for quick delivery and processing of goods and materials in order to minimize processing and storage costs. Firms not being able to deliver the wanted quality at the right moment in time, will simply lose their customers. The relevance of this study should thus also be seen against the background of Europe 1992: a unified European Market of some 300 million customers and strong competition between financially strong multinational firms.

Although the main focus of this study is on the quality of the road network, the quality of the public transport system is also discussed. This is in line with the current national policy promoting the use of public transport in stead of private cars in order to reduce road congestion and thereby the need for extending the road network, given the environmental effects of extending the road network in a densely populated country like the Netherlands.

#### 4. TRANSPORTATION PLANNING ISSUES IN THE PROVINCE OF NORTH HOLLAND.

##### 4.1. Introduction

In the Netherlands, provinces are strongly involved in physical planning and have the legal obligation to make every ten years a so-called Regional Plan in which the possibilities and limitations are described of the way people living in the regions under the provincial jurisdiction may use the space for living, working, recreation and so on. This Regional Plan is the result of a democratic political process, in which specific interests are weighted against each other from the perspective of legal obligations set out by the national government. Interested parties, including individual people, have the right to have their say either directly - by means of participation - or indirectly - by means of indirectly voting the provincial representatives. Local governments are bound to act under the restrictions of such a plan, as soon as it has officially been accepted.

In the following the most important provincial priorities (see especially Provinciaal Bestuur van Noord-Holland (4, 11-15)) are briefly described, since they are found to be of ultimate importance for our study, as they either restrict, promote or induce extensions or improvements of the road network. In the last part of this section quality standards for roads are also discussed. Since infrastructure priorities in the three regions under consideration do not show much variation, no exact description of region-specific priorities will be given here.

##### 4.2. General Provincial Side Conditions

###### Physical Planning

Physical planning concerns inter alia the following issues:

- (1) concentration of urban settlements;
- (2) preservation of (openness of) rural areas;
- (3) preservation and improvement of environmental quality;
- (4) promotion of recreation near residential areas;
- (5) promotion of agriculture (economic conditions, physical planning);
- (6) meeting the demand for housing of inhabitants and of people living in the southern part of the province (especially Amsterdam);
- (7) promotion of the service functions of major cities;
- (8) concentration of economic activities; amongst others by realization and preservation of satisfactory traffic networks (including public transport), in order to limit mobility growth (viz., the north-south commuting);
- (9) prevention of reduction in population size in these areas.

### Traffic

Traffic policy is as much as possible aimed at a reduction of commuting; public transport facilities are to be improved. Capacity problems of the road network should be met by means of widening of roads and removal of bottlenecks within the existing main network. Extensions of the main road network are only possible if economic analyses would convincingly demonstrate that bottlenecks in the existing network preclude the necessary regional economic development.

### Economics

The importance of using public financing to improve the production environment and the reinforcement of the production structure in the three regions is emphasized. Special consideration is given to small and medium-sized firms, recreation, tourism and agriculture.

### Living and Working

Spatial concentration of living and working facilities is necessary, notably near Alkmaar-Heerhugowaard and Hoorn. More jobs in these places are necessary in order to stop the growth of congestive commuting traffic.

### Environment

Environmental conditions in these regions are reasonably good, and hence rural areas and areas with cultural-historical heritage should be preserved.

### Recreation

Public transport facilities should also be used for recreational trips. This means that recreational areas should be at short distance from residential areas and near public transport routes. The use of bicycles for recreational trips should be promoted.

## 4.3. Traffic Criteria

Next to the above mentioned political considerations, a number of traffic-related criteria is used to analyze the quality of the road network in this area:

- (1) current road use vis-à-vis road capacity;
- (2) expected future road use vis-à-vis road capacity (including planned capacity extensions);
- (3) actual travelling time vis-à-vis possible travelling time (maximum speed, road situation, road function);
- (4) accessibility of major locations;
- (5) road safety;
- (6) matching of demand of commercial users of the transport network;
- (7) impact of potential bottlenecks in the road network;
- (8) urgency of solutions to these bottlenecks.

## 5. TRANSPORT PROBLEMS.

## 5.1. Introduction

The roads to be dealt with include four more or less parallel east-west connections (the S28-S29, T27, S6 and T28, see chart 2 at the end of this study) and one north-south connection (the T13). Traffic growth on the two north-south highways A7 and A9 and on the ring road S7 near Alkmaar has only been analyzed in order to get a clear picture of road use in this part of the province of North-Holland.

A large part of the discussion deals with the east-west connections, whereas the north-south connection T13 is only marginally discussed. This is in line with the relative importance of these roads for commercial traffic.

## 5.2. Development of Traffic on Major Roads

Traffic on major roads has grown particularly in the period 1975-1988 as Table 5.1 shows.

Table 5.1. Development of Traffic on Major Roads  
(working day year intensities; both directions).

	S28 (a)	S28 (a)	A7	A9 (a+b)	A9 (a+c)	S7	T28	T13	T27	S6
1975	9476		18900			21393	2848			
1976	9993		-			20919	2640			
1977	10526		23000	33500		-	2246			
1978	10376		24500	35000		-	2240			
1979	9826		26500	36000		-	1978			
1980*	10593		28500	36500		30828	2258			
1981*	9219	7900	28500	36000		-	2319			
1982*	8964	7800	28500	37000		-	2524		4300	
1983	9065	8200	31500	42000		-	2402		-	6446
1984	9000	7400	33500	41500	13000	-	2485		4000	6518
1985	9047	-	35000	42500	13500	26045	2569	1967	-	6489
1986	9162	7700	38000	44000	14500	27629	2600	-	-	6991
1987	9126	-	36500	46000	14750	31084	2666	-	-	7577
1988	9853	-	38299	47876	-	32088	2705	-	-	8091

Notes: (a) Different measuring points; (b) South of Alkmaar; (c) North of Alkmaar.

(\*) In 1980-1982 the Netherlands faced a serious economic stagnation.

With the exception of the A7 and A9, all roads are motorways.

Source: Provincie Noord-Holland/Dienst Wegen, Verkeer en Vervoer.

In this period mobility in the Netherlands grew strongly. Except for the two highways (A7 and A9), most roads in this region did not follow this trend however.

### 5.3. Travel Time, Accessibility and Road Safety

No precise figures were available on travel time. This may lead to serious problems when trying to evaluate the social cost of travel time in case of congestion or poor accessibility.

Accessibility in the road network in this region was found to be poor, because of the fact that most roads do not provide a direct and fast access to major working areas. Trucks also have to make detours to arrive at their destinations. Travel time is generally valued as too long.

As the economic center of gravity in Noord-Kennemerland (Alkmaar-Heerhugowaard) has a relatively large linear north-south shape, it has not one, but several major road links with the region of West-Friesland, since traffic is diverted to and from many directions. North-South (commuter) traffic - via the A7, A9 and S7 - clearly dominates East-West traffic.

With one major exception, most roads were found to be relatively safe. The number of traffic accidents did not grow much in this period. Given the general growth of traffic, most roads have become relatively safer.

### 5.4. Other Determinants of Road Quality

A survey among a number of road users and our fieldwork led to the following observations:

- (1) a number of roads is found to have too many or unsafe curves;
- (2) some roads are too narrow for freight trucks to overtake one another;
- (3) the existence of agricultural traffic on main roads is seen as dangerous, leading to congestion and unnecessary traffic delays.

### 5.5. Expected Traffic Growth

The Provincial Traffic and Waterways Agency (PWS) has used a computerized traffic model to predict the traffic growth in 1995. The input of this model consists of socio-economic parameters - total population, working population and employment - and parameters indicating the effects of urbanization plans. In 1981 this model was used as a basis for one of the Region Plans.

The model predicted in 1981, that the existing road network - together with a number of foreseen extensions - would be able to cope well with the demand in 1995.

Major criticisms on this model include the following items:

- (1) annual traffic growth in recent years may be much higher than modelled;
- (2) the socio-economic parameters may be no longer valid, because recent plans to expand the number of houses (based on related demographic patterns) - and the induced commuting flows were not included.

We do not share these criticisms, since both yearly traffic growth - although high - and the socio-economic parameters were still lower than that used as an assumption in the model.

## 5.6. Observations

The following observations emerge from the foregoing:

- (1) On the basis of the existing data, there does not seem to be a lack of road capacity in this area;
- (2) Some (parts of) roads may be too narrow for modern freight traffic;
- (3) Road traffic is found to be relatively safe on most roads;
- (4) The existence of agricultural traffic on main roads (strongly) reduces travel speed and may lead to dangerous situations;
- (5) Most bottlenecks are found to have a local character, although with a(n) (inter)regional impact as they are mainly used by through-traffic;
- (6) Severe bottlenecks need to be urgently eliminated given their direct effect on the transport sector and the indirect effect on other sectors.

## 6. SOCIO-ECONOMIC DEVELOPMENT.

In this chapter the most important characteristics of socio-economic development in the three regions in the period 1970-1987 are discussed.

### 6.1. Spatial Structure

The region of Noord-Kennemerland has developed from a rural area into an urban area. The cities of Alkmaar and Heerhugowaard are becoming the center of a urban region, with a strong concentration of living and working. The region of West-Friesland shows both concentration and dispersion of socio-economic activities. Kop van Noord-Holland and Texel has remained a rural area.

### 6.2. Population, (Un)employment and Commuting

In the next table the growth of population in the three regions is visualized. The most important cause for the growth of population in these regions is the national housing policy of the 1960's and 1970's. This spillover policy stated that migration movements of southern regions - especially from Amsterdam - were to be directed toward a number of so-called "growth towns", including Alkmaar and Hoorn.

The population in the region Kop van Noord-Holland and Texel did not

Table 6.1. The Development of Population from 1970 to 1987.

	Noord-Kenn.	West-Fr.	Kop N-H + Texel
1970	147.014	104.513	128.190
1980	190.930	151.470	154.613
1987	213.839	169.645	154.139
1989	216.954	167.550	153.517
Growth	47,6 %	60,3 %	19,8 %

Source: Economisch-Technologische Dienst voor Noord-Holland (1).

grow as much as the population in the other regions. In recent years economic conditions in this region have become worse, because of ongoing cuts in expenditure in the navy harbour city of Den Helder - the largest town in this region. The migration balance of this region has become negative, as especially younger people are moving to more Southern regions.

Tables 6.2 and 6.3 show developments in employment and unemployment in these regions.

Employment has grown in the three regions in this period. Unemployment shows also a strong growth in this period. As it appears from Tables 6.1 to 6.4 the growth of population was accompanied by a growth of employment, a growth of unemployment and a strong growth of commuting (to working areas in the Southern part of the province of North-Holland, viz., to Amsterdam, Schiphol and the Noordzeekanaal Area (including the Hoogovens steel and aluminium factory)).

Living and working areas show therefore a very uneven spatial distribution. This emphasizes the fact that in a market economy government can do little to influence locational behaviour of firms. It may influence settlement

Table 6.2. Development of Employment in 1973-1986.

	Noord-Kenn.	West-Fr.	Kop N-H + Texel
1973	42.234	30.410	33.958
1977	46.373	32.719	35.768
1980	51.050	37.217	37.578
1986	60.335	44.700	41.725
Growth	+ 43 %	+ 47 %	+ 23 %
(Compare:)			
1963	35.448	26.260	29.799

Source: Economisch-Technologische Dienst voor Noord-Holland (1).

Table 6.3. Development of Unemployment in 1970-1987.

	Noord-Kenn.	West-Fr.	Kop N-H + Texel
1970	422	156	330
1975	1.499	894	1.136
1980	2.343	1.563	2.061
1985 (a)	9.199	5.996	6.157
1987	9.323	5.162	5.632
Growth factor	22,09	33,09	17,07
PEP (*) (b)	88.700	69.250	63.000
(a) as % of (b)	10,37	8,66	9,77

(\*) Potential employment population: People between 15 and 65 excluding those going to school or university.

Source: Economisch-Technologische Dienst voor Noord-Holland (1).

conditions for firms, e.g. by means of its housing policy, the construction of infrastructure, subsidization, loans and so on, but the actual location decision of firms is a purely private one.

The strong growth of commuting has led to a strong additional growth of traffic, especially by road vehicles. The declining family density and the corresponding growth of smaller households also induced additional traffic. Continued growth of private incomes and the growth of leisure time have also led to a growth of car ownership and use.

The low quality (or non-existence) of public transport in these areas has also induced the use of cars. Major roads, especially the two main high-ways A7 and A9, show therefore serious congestion, especially in the tunnels connecting the northern and southern parts of the province of North-Holland - underneath the Northsea Canal - and on their feeder roads.

Table 6.4. The Development of Commuting in 1971-1985.

	Noord-Kenn.	West-Fr.	Kop van N-H + Texel
1971	9.967	3.905	3.045
1975	16.200	7.900	7.100
1981	22.400	14.400	7.200
1985	25.500	13.700	6.500
Growth factor	2,56	3,51	2,14
(Compare:)			
1960	4.796	2.445	1.835

Note: Some one-third of commuting is outgoing.

Source: Economisch-Technologische Dienst voor Noord-Holland (1).

In table 6.5 figures on national economic development are given as a frame of reference.

Table 6.5. Development of National (Un)employment in 1973-1986.

	Employment	Unemployment (a)	PEP (b)	(a):(b) %
1973	4.346.364	109.896	7.499.936	1,47
1975	4.388.585	195.303	7.577.255	2,58
1980	4.661.995	247.959	7.731.893	3,21
1983	4.455.750	798.047	7.963.850	10,02
1986	5.092.537	709.655	--	--
Growth + 17,2 %	growth factor 6,46		1,06	6,82
(Compare:)				
1970	--	46.418	--	--

Note: PEP = potential employment population.

Source: Economisch-Technologische Dienst voor Noord-Holland (1).

### 6.3. Regional Economic Chances and Challenges

#### Common problems

The three regions - although showing different development patterns - have a number of economic problems in common, e.g., the low percentage of female labour force participation (because of lack of part-time work and of adequate travel distance and time) and the high youth unemployment.

#### Sectoral economic development

In the following tables (6.6-6.8) sectoral economic development is visualized. Since employment figures of this nature are very unreliable - because of the way in which they are collected - only the migration of firms is given. Figures of the district of the Chamber of Commerce (CCD) in Alkmaar include both Noord-Kennemerland and Kop van Noord-Holland and Texel. Figures of CCD Hoorn include the regions of West-Friesland and Waterland. More desegregate figures were not available.

The development of national employment per sector is given in table 6.9.

From these figures, it becomes apparent, that the district of Alkmaar has had a strong growth of new firms in recent years, whereas the district of Hoorn attracted only a small number of new firms, despite the fact that economic conditions in this period were very positive for commerce and industry in the Netherlands. A look at the development of the total (un)employment figures reveals, that both are higher than national figures. Sectoral developments were positive for most sectors in Alkmaar; economic structure followed closely the national pattern. Figures of Hoorn show rather negative developments, since most sectors tend to lag behind

Table 6.6. Migration of Firms in CCD Alkmaar in 1984-1988.

SBI code	New		(Number of firms) Discontinued		Balance	
	abs.	(% tot.)	abs.	(% tot.)	abs.	(% tot.)
0...	216	(11,78)	4	(3,88)	212	(12,25)
1...	23	(1,25)	1	(0,97)	22	(1,27)
2...	94	(5,13)	6	(5,83)	88	(5,09)
3...	86	(4,69)	2	(1,94)	84	(4,86)
4...	0	(0)	0	(0)	0	(0)
5...	189	(10,31)	11	(10,68)	178	(10,29)
6...	575	(31,37)	41	(39,81)	534	(30,87)
7...	104	(5,67)	6	(5,83)	98	(5,66)
8...	438	(23,90)	24	(23,30)	414	(23,93)
9...	108	(5,89)	8	(7,77)	100	(5,78)
Tot.	1.833	(100,00)	103	(100,00)	1730	(100,00)

Note: The SBI (Standard Industry Classification)-codes are explained in Table 6.8.

Table 6.7. Migration of Firms in GCD Hoorn in 1985-1987.

	(Number of firms)		Balance	% tot.
	New	Discontinued		
Agriculture	60	86	-26	-5,38
Industry	197	132	65	13,46
Construction	169	124	45	9,32
Wholesale	249	215	34	7,04
Retail trade	383	397	-14	-2,90
Basic services	475	296	179	37,06
Non-basic servic.	368	259	109	22,57
Other services	43	43	0	0
Holdings	128	37	91	18,84
<b>Total</b>	<b>2.072</b>	<b>1.589</b>	<b>483</b>	<b>100,00</b>

Note: For GCD Hoorn SBI-data were not available.

Table 6.8. Explanation of SBI-codes.

Code	Sector
SBI 0...	Agriculture & fishing industry
SBI 1...	Mining
SBI 2...	Industry
SBI 3...	Industry
SBI 4...	(Public) gas, water & electricity
SBI 5...	Construction & installation
SBI 6...	Trade, hotels and restaurants & repairing of consumer goods
SBI 7...	Transport-, storage- & communications
SBI 8...	Banking, insurance & business services
SBI 9...	Other services

Table 6.9. Development of National Employment per Sector in 1973-1986.

Sector:	1973	% (a)	1986	% (a)
Agriculture	222.419	5,12	219.496	4,31
Mining, industry	1.222.199	28,12	1.001.437	19,66
Gas, water, electricity	44.763	1,03	45.608	0,90
Building & construction	438.854	10,10	334.756	6,57
Trade etc.	800.019	18,41	973.927	19,12
Transport etc.	265.652	6,11	337.474	6,63
Banking etc.	324.203	7,46	556.671	10,93
Other services	1.028.255	23,66	1.623.168	31,87
<b>Total employment</b>	<b>4.346.364</b>	<b>100,00</b>	<b>5.092.537</b>	<b>100,00</b>

Note: (a) As % of the total employment in that year.

Source: Economisch-Technologische Dienst voor Noord-Holland (1).

national developments; the economic structure is dominated by the agricultural and the building sectors. The dominance of the agricultural sector in its economic structure is not without risk, since agriculture will have to face a large number of problems in forthcoming years, including rationalization in some subsectors and strong environmental constraints. Kop van Noord-Holland and Texel is very much dependent on the government sector; most other sectors tend to lag behind national developments. The budget cuts in the government sector are a strong problem for this region.

#### 6.4. Location Factors

Location theory (see e.g. Meester & Pellenburg) shows that to entrepreneurs the quality of the following location factors is decisive for location behaviour (a higher ranking indicates a higher importance):

- (1) Relative location;
- (2) Infrastructure;
- (3) Accessibility;
- (4) Economic relations within the region;
- (5) Qualities of the site or plant;
- (6) Costs of real estate;
- (7) Government;
- (8) Labour market;
- (9) Agglomeration effects;
- (10) Business competition;
- (11) Motivation of the labour force;
- (12) Environment and living conditions.

Meester and Pellenburg and De Haan & Van Tricht conclude that the three regions have relatively low scores on the factors 1, 2, 3 and 8 (the quality of the labour force is not in line with the needs of the entrepreneurs). Scores on the factors 6, 7, 11 and 12 were relatively high.

#### 6.5. Conclusions on Regional Economic Development

The socio-economic developments in the three regions show a different pattern. The region of Noord-Kennemerland has used the available opportunities very well, which cannot be said of the other two regions.

On the other hand, other studies (e.g. by Buck Consultants, Haan & van Tricht, Provincie Noord-Holland/Dienst Ruimte en Groen, The Wissema Group, Vughts) show that economic potentials are available in the agro-industrial complex (production, cultivation, breeding, trade and transport of products) in West-Friesland. High-tech firms may find their place in Noord-Kennemerland (especially near Alkmaar; see Hassink). Government is also asked to compensate for its budget cuts in marine defense facilities in Den Helder.

Full use of available opportunities requires however - inter alia - the improvement of infrastructure in these regions and between these regions and the southern parts of the province of North-Holland (notably with Amsterdam, Schiphol and Zaandam) and the eastern part of Holland (to West-Germany).

The low quality of the infrastructure is however not the only negative

location factor in this region. We may mention also the bad fit between demand and supply of labour.

In the following chapter a strategic discussion of ways to improve the road network within the three regions is given.

## 7. SIX INFRASTRUCTURE SCENARIO'S AND THEIR EFFECTS.

### 7.1. Introduction

The most important conclusion from the fieldwork of our study is that bottlenecks in the east-west connections and the north-south road T13 are part of a much larger problem, viz., a series of serious local traffic bottlenecks. These bottlenecks themselves are part of the total accessibility problems (including public transport) of the regions Noord-Kennemerland, West-Friesland and Kop van Noord-Holland and Texel. Furthermore, measures to improve the infrastructure network should not interfere with the political conditions discussed in section 2.

Although improving the regional infrastructure may have positive regional economic effects if economic potentials exist in a region, improving infrastructure is only one of the instruments which government may use to improve the regional economic situation.

### 7.2. Six Scenario's

In the following a set of potential solutions to the problems analyzed in chapter 5, and their impact on important parameters are described by means of six scenario's.

Scenario I: No improvements of the road network are implemented; the zero option.

Scenario II: Only marginal improvements are implemented to eliminate unacceptable bottlenecks in the road network; the zero-plus option.

Scenario III: A number of drastic and structural improvements of the road network - including feeder roads - and public transport networks is implemented; the renovation option.

Scenario IVa: A completely new east-west connection will be built (the N23), eventually partly via existing roads; the road construction option.

Scenario IVb: As scenario IVa, but including improvements of feeder roads to anticipate the foreseeable additional growth of traffic on these roads because of the construction of the N23; the road construction - plus option.

Scenario V: A combination of the scenario's III and IV is implemented, viz., a drastic improvement of the existing road network in combination with the construction of the N23; the road expansion option.

In the following table the effects of these options on basic parameters are discussed.

Table 7.1. Compatibility of Options with Provincial Side conditions and Traffic Criteria.

Scenario	I	II	III	IV	V	VI
Physical planning	++	++	++	-/+	-	--
Traffic econ. effects	--	-	++	-/+	-/+	++
Regional econ. effects	--	-	+	0	-/+	++
Environmental effects	++	++	-/+	-	--	--
Recreation	++	++	-/+	-	--	--
Bottlenecks	--	-	++	-/+	*	++
Financing	++	++	-/+	-	--	--

Legend: -- = very bad; - = bad; 0 = neutral; -/+ = average;  
\* = more than average; + = good; ++ = very good.

From this table it becomes clear, that scenario III suits best both provincial side conditions and traffic criteria. As the economic center of gravity in Noord-Kennemerland has a relatively large linear north-south shape, it does not need one major road link with the region of West-Friesland, since traffic is diverted to and from many directions.

### 7.3. Other Measures

It is evident that traffic problems are not the only ones to be solved in these regions. Other measures include improvement of inter- and intra-regional institutional relationships between governments and other (private or public) actors, agencies and organizations, since current co-operation is far from optimal, leading to unnecessary and harmful competition between the three regions. Positive promotion directed to firms in other parts of the country is necessary, in order to offset the negative locational image of these regions. The foreseen agricultural rationalization and restructuring needs government support, including financial contributions.

## 8. CONCLUSION.

The northern part of the province of North-Holland was found to have a far from optimal functioning of its road infrastructure and public transport networks. Bottlenecks exist both in North-South as well in East-West connections.

Next to discomfort for road users, high costs are inflicted on commerce and industry, whereas chances for regional development are missed and challenges engraved. Improvement of the road and public transport networks is then one of the necessary conditions for improving this situation. The proposed solution of these problems is in line with the provincial side conditions. It should be clear however, that solving these bottlenecks is an important but not sufficient measure to improve economic conditions in these regions.

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CHARTS

Chart 1. The Regions of the Province of North-Holland.

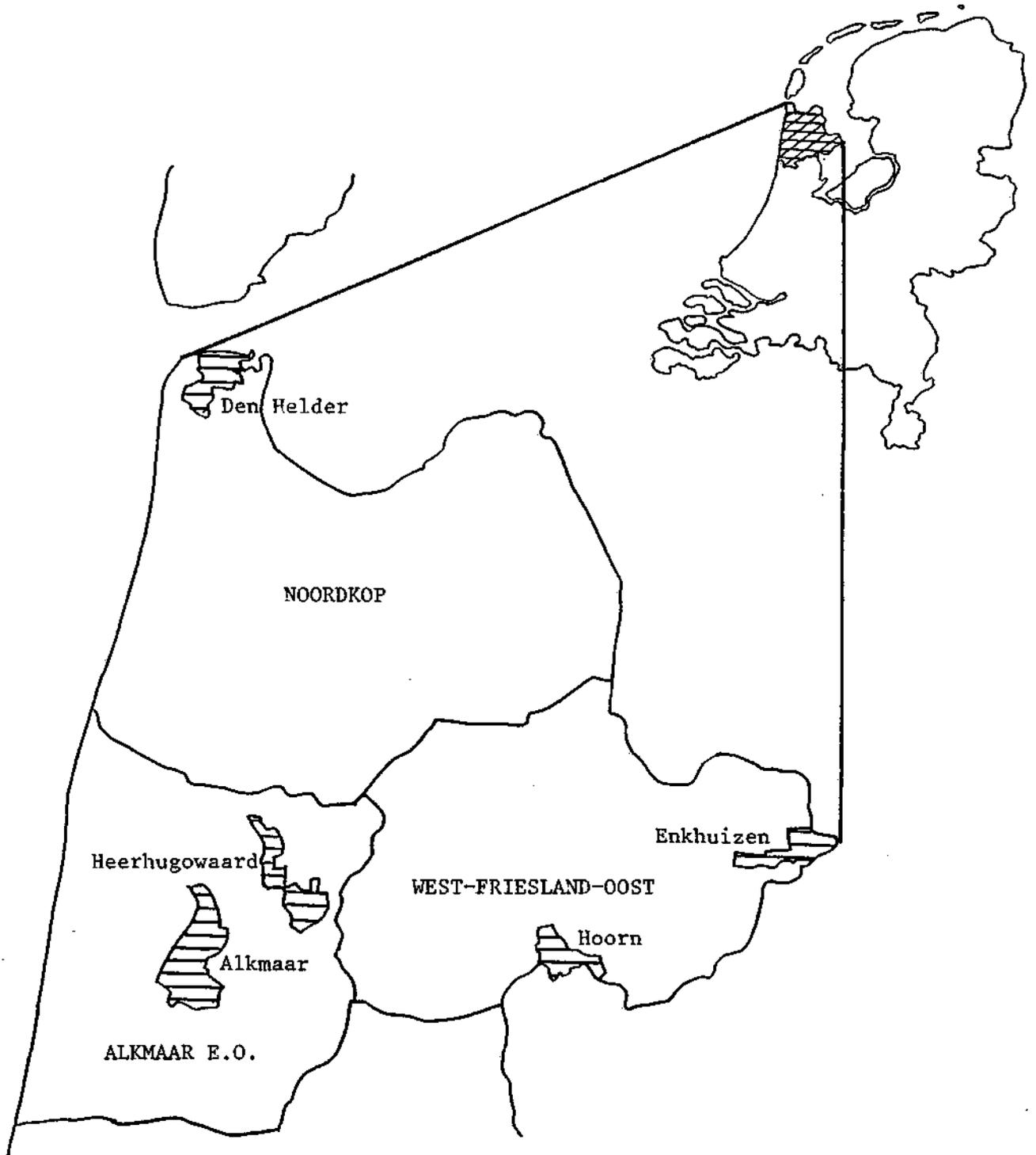
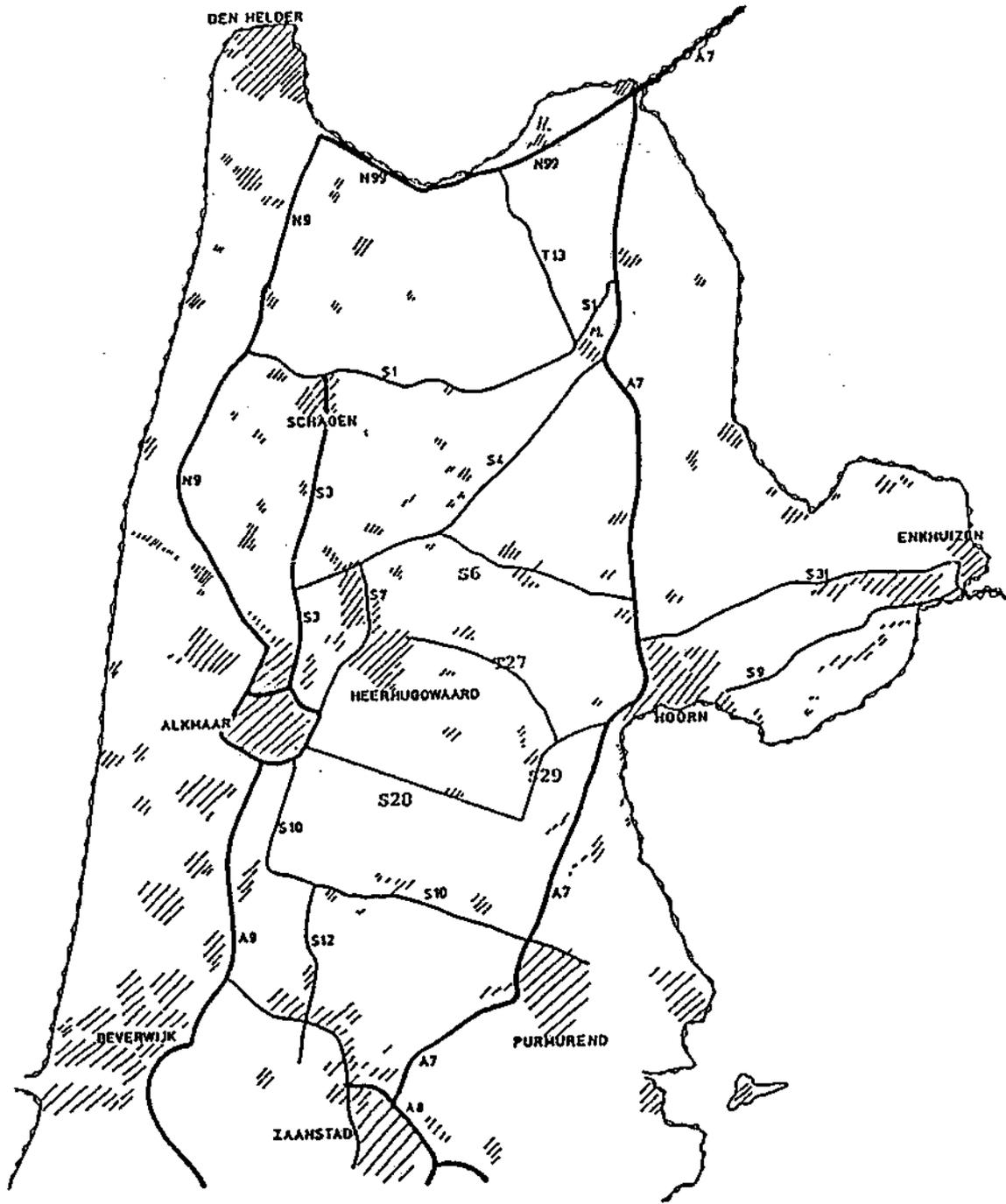


Chart 2. Major Roads in the Northern Part of the Province of North-Holland.

(Source: City of Alkmaar).



WEGENPLAN  
NOORD-HOLLAND