

The planning of an airport system, a comprehensive approach

by

D. RIEMENS

Schiphol Airport Authority, The Netherlands

and

R. P. VAN DER KIND

Netherlands Institute of Transport

1. INTRODUCTION

In the Netherlands, like in so many other countries, we are confronted with the problem of the short-fall of capacity of existing airports. Although the problem, in consequence of the recent stagnation of economic development would appear to be less urgent, it should, however, be borne in mind, that world air traffic, despite the recession, still shows a reasonable growth of approx. 6% a year, while future expectations in general range around 8% per year. The problem accordingly continues to exist, though it is likely to manifest itself in a somewhat milder form.

In the present structure of society it is no longer possible to consider the airport capacity problem from the narrow viewpoint of transport economics. Many other aspects also feature in such a problem: town and country planning, the overall traffic problem, in the air as well as on the surface, and the balanced repartition of same, traffic congestion and the inherent problem of mobility in general, international relations, employment, etc.

Neither is it conceivable in the present social configuration that a decision for a substantial expansion of the airport capacity should exclusively be taken at one decision level without other official bodies and persons directly involved being enabled to participate in that decision. Such a decision in fact so fundamentally affects the national budget, the proportionate distribution of costs (and benefits – which in connection with airports sometimes tends to be overlooked) and other national policy objectives that it could not be taken without due consultation with interested parties.

In the Netherlands attempts have of late been made towards achieving an adequate solution to the airport problem, in which both aspects, i.e. the linking-up of the airport problem with other aspects of overall national policy, and a decision-initiation approach under which all parties concerned are enabled to take part in the decision process, are being taken into account.

The following review, which is rather a case study of an experience of a wide-scope decision than an in-depth theoretical paper, therefore only claims to be comprehensive in the following two ways, viz.

a. by including in the considerations, apart from the airport capacity proper, also the consequences in other sectors of society besides the air traffic sector proper, and

b. by also paying attention, besides to the technical planning problems, to decision-taking procedures and consultation structures (including government bodies, trade and industry, research institutions as well as repre-

sentatives of the population), which ought to be taken into account in arriving at a suchlike decision.

The fact that the present paper is the product of a co-operation between two authors, one being engaged in industry and the other in a government agency and the research side, may go to show that it is possible to reach such a co-operation in the latter field, in spite of the fact that the aims of the two interest groups do not always run parallel.

2. BRIEF DESCRIPTION OF THE PRESENT COMPLEX OF PROBLEMS

2.1. Description of the present system

The airport system in the Netherlands comprises, besides a number of minor airfields for general aviation and gliders, one major central airport (Schiphol), where 92% of the total air traffic to and from this country is concentrated, and five airports of less importance. The largest of these five airports is the airport of Rotterdam, which accounts for approx. 7% of total air traffic; the other four airfields, two of which are military ones being partly open to civil aviation, between them account for a few per cent of total air traffic. (See fig. 1).

It may therefore be argued that the future growth of air traffic in the situation given will be determined by the coping abilities of Schiphol airport, the more so since the only other airport of national importance, i.e. Rotterdam, is destined to be closed down, while the remaining four airports in their present form will certainly not be able to accommodate any substantial sections of the air traffic.

2.2. Capacity of Schiphol airport (see fig. 2)

The capacity of Schiphol is largely determined by the runway system, in the use of which account is to be taken of the noise-sensibility of the airport's surroundings. This sensibility to noise and the consequent pressure from the neighbourhood towards limiting the resultant disturbance have led to a system of preferential runway use being introduced at Schiphol, as a result of which a maximized utilization of available runway capacity is no longer possible.

On the basis of this restricted utilization the capacity of Schiphol's current runway system may be estimated at approx. 235,000 air traffic movements, a volume which according to the latest estimates is anticipated to be reached by 1990.

Apart from the runway system and the neighbourhood's noise sensibility, some additional factors which may possibly have a limiting effect on capacity can be

development of regional airfields and schiphol



Fig. 1.

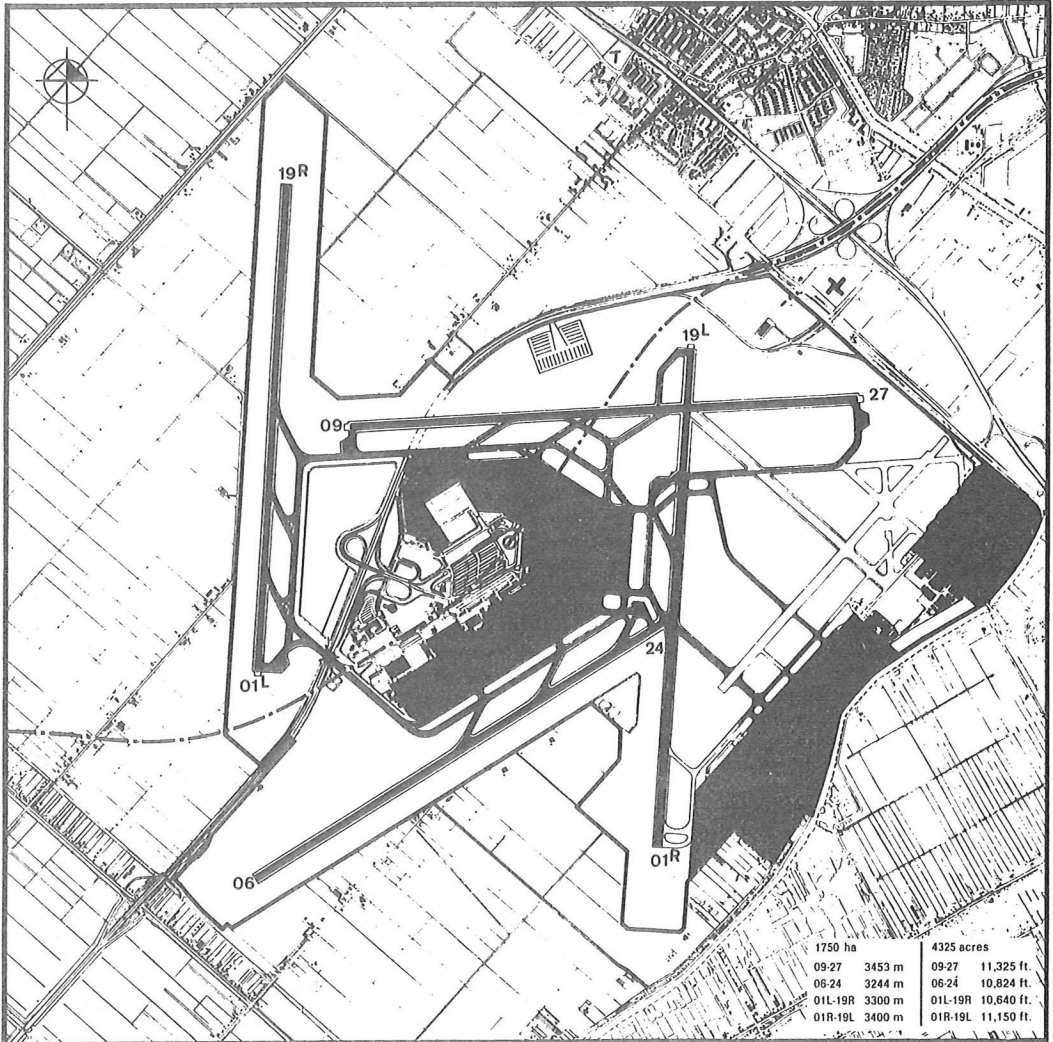


Figure 2 - Schiphol the present

designated, i.e. the surface traffic infra-structure around the airport, the terminal facilities etc. at the airport, and the urbanization problems which ensue from the development of employment at Schiphol.

2.3. Possibilities of utilization of the regional airfields

With the regard to the possibilities of utilization of the other airfields it may likewise be noted that substantial pressure from the neighbourhood of these airfields towards restriction is being exerted. In the case of the Rotterdam airport this has even assumed such proportions that a principle decision has already been passed by the municipal council to close the airport altogether. Intervention on the part of the central government has however resulted in this resolve not yet having been carried into effect.

3. POSSIBILITIES OF ACHIEVING A SOLUTION

When reviewing the foregoing it appears that a number of alternatives are open in order to bring the future

supply and demand of airport capacity into harmony with each other. In discussions between government bodies, aviation authorities and other professional people on the one hand and research people on the other hand, a programme of studies has gradually come into existence in which all these alternatives have been given more elaborate consideration. In view of the urgency that was being assumed to exist at the time (Schiphol was supposed to reach saturation in 1983) the study which was aimed at the creation of a Second National Airport (SNA) was given priority, also in view of the expected complexity of the problems concerned. This study was initiated by the Civil Aviation Authority. Right from the start it was being taken for granted that also other aspects besides air traffic aspects should be included in the considerations. This led to the setting-up of a Steering Committee, on which were also represented, besides the CAA, representatives of the Physical Planning Agency, the Ministry of Traffic and Transport, the Central Planning Agency etc., all these bodies being directly involved in a possible creation of a SNA. It was ultimately this Steering Committee which to a large extent

determined the course and content of the actual work as far as the SNA study was concerned.

Apart from the government bodies directly concerned, however, also the participation of less directly interested parties was to be safeguarded. To this end a consultative body between the Steering Committee and these interested parties was set up, comprising local government authorities, other ministries and similar bodies.

The terms of reference of this group, besides contributing to the forming of opinions, was to ensure also the communication between researchers and interested parties, such as neighbours, action groups, trade and industry, etc. It was particularly the forming of judgments within this group which has effected the gradual widening of scope from the mere SNA problem to consideration of overall problems relating to airport capacity.

During these consultations it was already becoming apparent that each of these alternatives had its advantages and disadvantages. These advantages and disadvantages will be briefly dealt with below.

3.1. Extension of Schiphol

Enabling it to cater for the total traffic demand. From the aviation optic this solution is obviously to be preferred: split operations are not necessary, interlining can take place without difficulty, full utilization of investments takes place, while the additional investments will be relatively low, and the problems of aviation politics will not be more difficult than they have been so far. The drawbacks of this solution are situated outside the direct aviation sphere: the disturbance to the neighbourhood, despite the fact that aircraft engine noise will decrease in the future, is likely to remain a significant factor, the open area will gradually be affected and the infrastructure is bound to become very heavy.

3.2. The solution through the creation of a Second National Airport (SNA)

This is a very expensive solution, which may however adequately solve the problem, particularly if the location is carefully chosen and future potentialities of expansion are taken into account. The advantages of this solution are obvious: the disturbance around Schiphol can be kept to a limited level, the open area can to a large extent remain open, air traffic growth will not be hampered, etc. The drawbacks, however, are likewise obvious: the solution is expensive, both from the viewpoint of investments and from the viewpoint of duplicate operation, it will be a long time before the SNA is operational, problems of aviation politics will arise due to the fact that operations will have to be distributed among the two airports, and ATC problems with two major airports in the relatively small air space available to the Netherlands, will by no means become easier.

3.3. The third solution

that may be envisaged might be found in improving the existing regional airfields in such a way that these may take over part of Schiphol's air traffic. This solution is less than optimal in so far as only a relatively minor increase of airport capacity can be achieved, and this at relatively high cost (although the cost will be lower than in the case of a second National Airport). A significant advantage, however, might be the fact that by way of employing these airfields in this manner, a gain of time is achieved.

A far-reaching decision like the construction of a SNA may then be taken under less pressure. From a physical point of view the solution referred to will bring about a spreading of activities to the country's periphery which, in view of the centralization trends towards the western

conurbation, would be a welcome development. The drawbacks are rather significant, though; distribution of operations among several airfields; in view of the location of the regional airfields (close to built-up centres) a substantial increase of the number of noise-affected people is to be anticipated; a very complicated set of ATC problems. Also the problems related to aviation politics, associated with the division of the traffic among the airfields, will by no means be simple.

3.4. The most drastic solution

is that which by means of a purposeful policy aims at keeping the demand for air traffic limited to such an extent that an extension of capacity can be dispensed with. From the aviation point of view this is clearly not the most desirable solution. In view of the important position that the transport sector occupies in the Dutch economy (cf. diagram), it is not the best solution from the economic optic either. A number of advantages in the way of conservation of the environment and physical planning can however be indicated: reduction of disturbance, reduced encroachment upon the scarce open areas and a less extensive infrastructure.

4. STRUCTURE AND RESULTS OF THE STUDIES

The foregoing is a rough outline of current airport problems along with an indication of possible solutions. It is clearly unfeasible, within the framework of the present paper, for the various possible intermediate forms of the four solutions considered to be thoroughly dealt with.

In the following an equally broad description will be given of the way in which the problems referred to have been tackled on the research side.

Also some results of the studies carried out will be presented and a number of tentative conclusions drawn. In the last chapter the way in which the results of the studies are being brought into the political decision process as well as the interplay arising between decision preparation and decision implementation will be briefly dealt with.

4.1. Extension of Schiphol airport (see fig. 3)

In the study relating to the possibilities of extension of Schiphol [1] the following are reviewed:

- what possibilities are still left for Schiphol to be expanded without the disturbance to the neighbourhood increasing;
- what possibilities still exist to restrict the nuisance to the neighbourhood, without the capacity having to be enlarged.

Accordingly only the supplement to the present capacity is being evaluated; the functioning of Schiphol in its present form is not gone into. Taking these starting points into account, two variants ultimately remained, one under which the present runway system would be extended by the addition of a parallel N/S 5th runway, and one under which the existing fourth runway would be turned in such a way that an alleviation of the noise disturbance could be expected. The latter alternative naturally did not produce any capacity gain. The solution with the parallel 5th runway did produce a capacity gain; this was calculated at 50,000 to 60,000 movements, i.e. an increase compared to present capacity of 20 to 25%. That this gain is only 20 to 25% is mainly due to the fact that by the addition of a fifth runway an unbalanced runway system is created (3 runways N/S, 2 runways E/W). As a result the gain in capacity was limited to the maximum acceptable supplementary load in the direction with the least capacity. In order to obtain a larger capacity gain, another (6th) runway would have to be provided in this

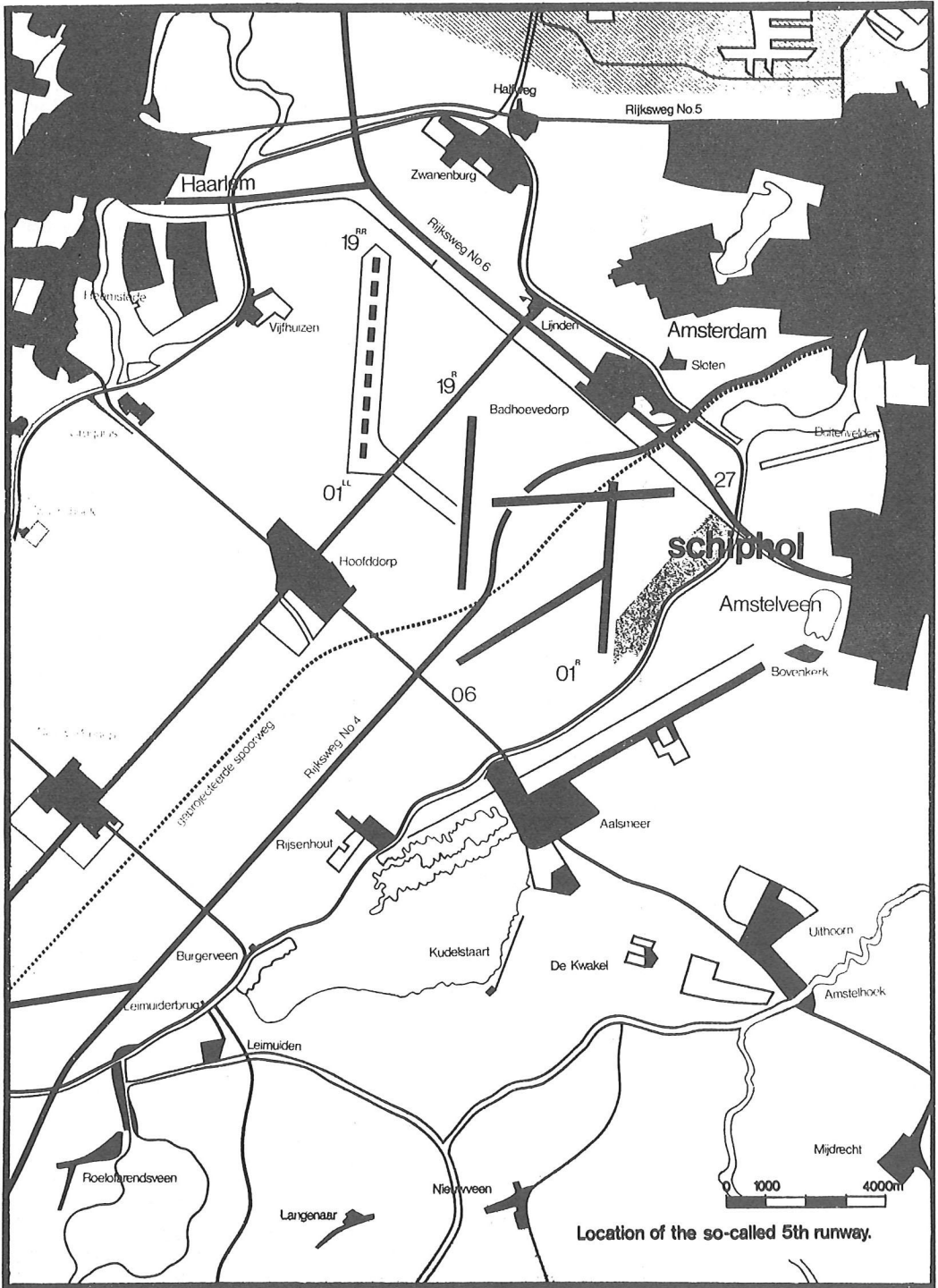


Fig. 3

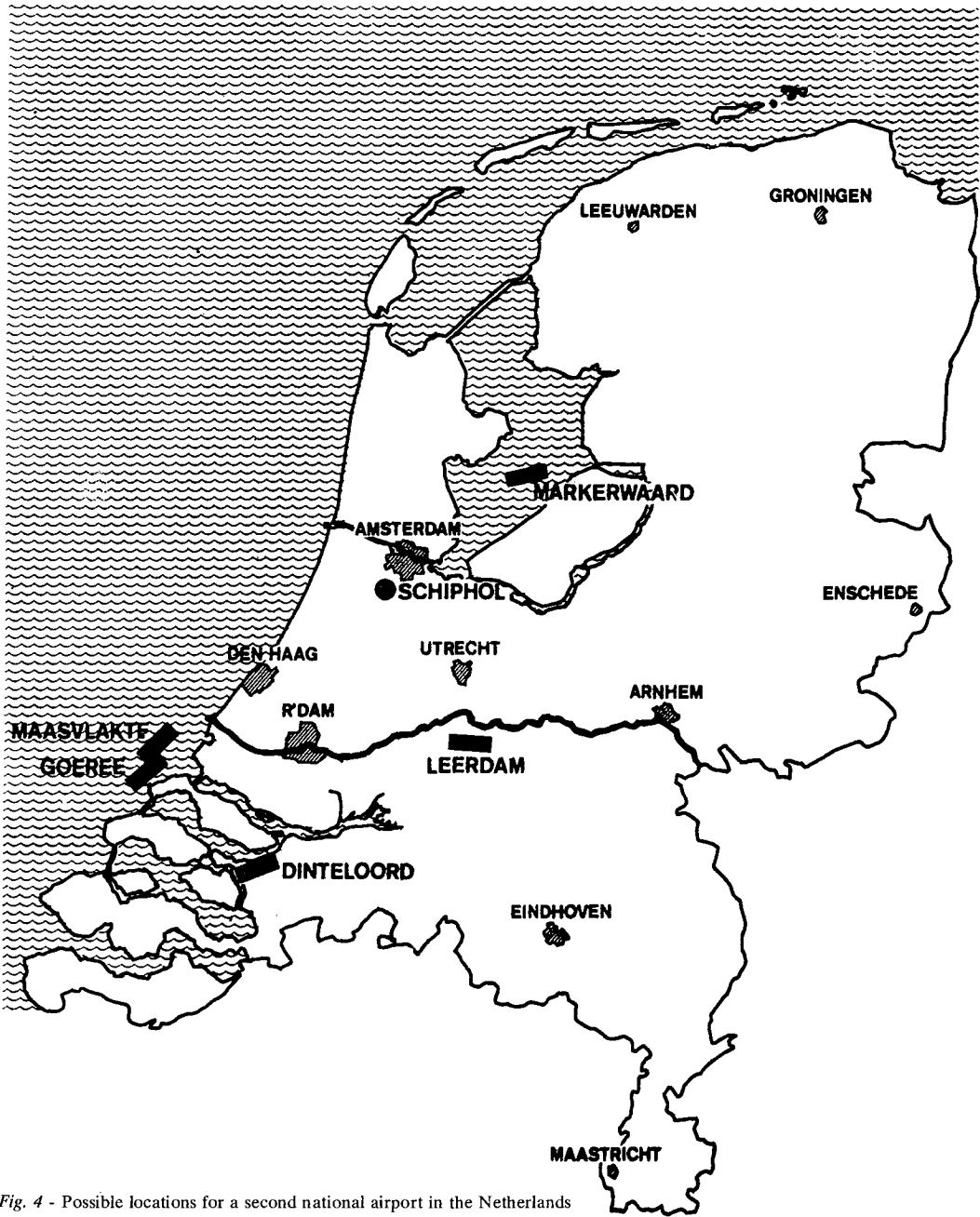


Fig. 4 - Possible locations for a second national airport in the Netherlands

latter direction as well. In view of the fact that an area in the extension of this possible 6th runway has meanwhile been assigned to residential housing, the extension of Schiphol is only possible by means of a 5th runway and its inherent other facilities. On the basis of the latest forecasts such an extension would result in Schiphol not being saturated by 1990 but around 1995.

4.2. Schiphol plus SNA

In view of the far-reaching consequences which the creation of a new airport may entail, it is not surprising that this alternative for the solution to the capacity problem has been thoroughly studied. Not only has the

question of the possible location been gone into, but it has also been investigated whether from a socio-economic point of view the creation or non-creation of a SNA would in itself be a paying proposition. For both analyses (the location as well as the socio-economic acceptability of a SNA) cost/benefit analysis techniques have been employed; the ins and outs of these will however not be discussed in the present paper. For those interested it may be noted that English translations of both studies have been published [2]. In order nevertheless to give an impression of the multitude of aspects that have been considered in the study, the broad outline of the model structure employed is shown in Annex 1.

In this paper only a general idea of the structure and results of this study will be given. The study was started in 1972 when in an inter-departmental commission, which had been set up to review the physical planning situation around Schiphol, the conclusion had been reached that the airport on the basis of the growth forecasts drawn up at the time, would reach saturation in the first part of the eighties. The commission then decided first to start a site selection analysis in regard to five possible locations and only after that to answer the question as to

whether another airport would in fact be expedient from a socio-economic point of view.

The site selection analysis

The five locations to be considered are shown in fig. 4. From this plan it is clear that there are marked differences between the locations. In table 1 the main differences, split up according to a number of the most important aspects, are shown.

Table 1 - Advantages and disadvantages of the locations

location	cost (soc.-econ.)	employment	planning	accessability	ATC	defense	noise
1. MARKERWAARD	relatively low	relatively favourable	empty area integration easily feasible, favourable for decentralisation from western conurbation	passable	passable	no major problems	favourable
2. LEERDAM	relatively high reason: land improvement defense	neutral	fine scenery; preferably to be kept open; unfavourable	excellent	passable	poor: transfer of a number of mil. bases	poor
3. DINTELOORD	relatively low	relatively favourable, reverse of commuter flow	relatively favourable no special scenery favourable for decentralisation	passable	poor in view of nearness of Belgium	no major problems	relatively poor
4. GOEREE	high, reason: construction of island + cross runways + infrastructure	relatively unfavourable	unfavourable owing to intersection of scenic areas and urbanisation	poor, one-sided (no distribution of traffic)	passable	no problems	favourable
5. MAASVLAKTE	very high, reason: construction of island + cross runways + infrastructure	unfavourable: labour market already tight	relatively unfavourable in view of construction of infrastructure	poor (one-sided, no distribution of traffic)	passable	no problems	favourable

The qualitative assessment of the various aspects shown in table 1 has been valuated in the cost/benefit analysis as much as possible in terms of money. Where this was not possible, because either the conversion into money implied a political judgement (e.g. employment) or because the appraisal methods failed, the aspects have been quantified as much as possible in terms of their own units. The ultimate order which emerged from the survey of material and immaterial aspects was as follows:

1. Markerwaard
2. Dinteloord
3. Leerdam
4. Goeree
5. Maasvlakte

The socio-economic analysis

The socio-economic c/b analysis has in principle been carried out on the same data as the location analysis. In this analysis the problem of the viability of a new major airport in the Netherlands is approached from two angles. First, it has been examined, through a conventional analysis based on differences in journey time with and without the second airport, what "costs" the non-construction of an SNA would entail on air transport users. This amounted to a computation of the difference in consumers surplus between the two situations. Apart from these advantages on the consumer side, however, an investigation has been made into the effect which an investment in airport capacity may have on the productive sectors of the Dutch economy. To this end use has

been made of the models employed for the forecasting of the development of the Dutch economy up to the year 2000 (Central Planning Agency). From this highly complex link-up of models a division has been made for this purpose in such a way that one sector describes the "air traffic and transport activities" and the other sector "the rest of the economy". Both sectors are interconnected by means of so-called forward and backward linkages.

With the aid of these model structures it was now possible to ascertain what shiftings and effects will crop up in the Dutch economy following a missive investment in the "air traffic and transport" term, as compared with a situation without a SNA. These shiftings and effects, expressed in terms of money, together with the consumers surplus, constitute the benefits of the SNA project, which benefits are set off against the costs, as these had to a substantial extent been collected already in the location analysis. Obviously in this analysis, as this had in fact also been done in the location analysis, several variants have been worked out. We will confine ourselves here to indicating only a few major variants.

socio-economic return of an SNA

	B/C ratio
High Forecast	3.76
Medium Forecast	2.16
Low Forecast	1.23

The conclusion was that the creation of a SNA would be an attractive proposition from the, socio-economic viewpoint. Nevertheless there were also considerable

uncertainties, as is also apparent from the effect of e.g. the forecasts in the above table. It likewise appeared, for instance, that the B/C ratio differed rather substantially according to location. A supplementary analysis to the results showed that 49% of these uncertainties were attributable to uncertainties in relation to future policy (consequently to be influenced, like the choice of the location, the division of traffic between the airports, etc.) and that 51% of the uncertainties concerned genuine uncertainty, that is to say caused by the inability to appraise future developments with any accuracy (e.g. forecast, development of income, etc.).

4.3. Capacity increase through regional airports [3]

Simultaneously with the SNA study, an investigation into the possibilities of development of the regional airports was carried out. This study however was not so much directed towards drawing up an overall cost/benefit assessment as on determining the maximum traffic volume which in favourable conditions might be accommodated at these airfields. These favourable conditions were interpreted in such a way that the package of services of the regional airfields was very substantial. The effect of great differences in frequency between for instance Schiphol and regional airfields was thus eliminated.

The choice of the airport is then determined by the following factors, viz.

- a. the airport's accessibility
- b. distribution of the population in the Netherlands
- c. the propensity to fly per region
- d. the choice of destination

The above does mean that the results found, as far as the regional airports are concerned, will be too optimistic. The intention was to ascertain to what extent these airfields would be able to relieve Schiphol's capacity problem. To this end an analysis of the airport selection behaviour of air travellers was made on the basis of extensive surveys, held virtually simultaneously at Schiphol and the regional airfields.

This study was likewise designed in such a way that policy-relevant alternatives could be rapidly elaborated. In total over 25 variants were worked out. In tables 2 and 3 the most important ones are given. From table 2 it appears that although the shares of the regional airfields do increase to some extent, the overall effect is not of such a nature as to bring about a very substantial lessening of the pressure on Schiphol.

The most significant influence lies with Rotterdam and Welschap (Eindhoven). These two airports, however, are precisely the ones (notably Rotterdam) whose closing or restriction is being contemplated. In order to ascertain what the effect of this closing or restriction will be, a variant can be worked out in which these two airports are assumed to be closed. This variant is shown in table 3.

Table 2 - Development of regional airfields and Schiphol in favourable conditions (% of total)

	Schiphol	Rotterdam	Maas-tricht	Twente	Gronin-gen	Eind-hoven
1973 (actual)	92	7	0.9	0.2	0.1	- (100)
1980 (forecast)	75	13	1.9	3.4	2.2	5.8 (100)
1985 (forecast)	76	11	2.4	3.5	2.7	5.5 (100)

Table 3 - Development of regional airfields, in favourable conditions and closing of Rotterdam and Eindhoven (% of total)

	Schiphol	Rotterdam	Maas-tricht	Twente	Gronin-gen	Eind-hoven
1973 (actual)	92	7	0.9	0.2	0.1	- (100)
1980 (forecast)	86.2	--	4.2	6.2	3.4	- (100)
1985 (forecast)	86.5	--	4.5	5.5	3.5	- (100)

From the latter table it appears that the closing of Rotterdam and Eindhoven would lead to a substantial proportion of Schiphol's capacity gain in variant I being lost again. Particularly if it is realized that the assumption of equal service packages imparts a flattered picture of the proportions of the regional airfields, it may be argued that involving these airfields will not produce an adequate solution to Schiphol's capacity problem. It may be a possible interim solution, though, which may offer some relief for a couple of years.

4.4. Restriction of the demand [4]

The solution through a purposeful policy directed on restraining the demand is associated with the evasive and comprehensive problem of the restraining of mobility. It is therefore understandable that the studies on this possible solution have been less concrete than the solutions described in the foregoing. On the other hand it may be expedient to point out that putting a restraint on the demand for air transport will contribute only to a limited extent to the overall restraining of mobility. Of the total number of medium and long distance transport movements only a small percentage relate to movements by air. The effects of restraining the demand have nevertheless been looked into yet. In doing so, there have been two approaches one directed from actual practice and one from a more theoretic point of view.

4.4.1. The theoretic approach

is mainly directed on holiday air traffic, since this is the sector in which the largest growth of air is anticipated. On the basis of the data of observed holiday habits of the Dutch it has been tried to assess with the aid of disaggregated model techniques how the choice of holidays is likely to develop in the future. Although the analysis concerned also comprises the choice between going and non-going on holiday as well as the choice between domestic and foreign holiday destinations, the outcome most relevant to the problem in hand is a description of the modal split conduct of the holiday-goers in the future.

The results of the forecast under unchanged policy conditions are shown in table 4 Variant III. More interesting for the present considerations is, however, the variant in which it is assumed that owing to some as yet undefined policy measure flying for holiday purposes is rendered impossible. The results of this variant are also reflected in table 4 Var. IV. On comparing the two situations it will be seen that the frustrated air travellers split up among the other modes of transport, the majority opting for the motor car - which is not likely to be the most desirable effect envisaged by such measure. (See also table 5).

4.4.2. The practical approach

does not so much base itself on the effect which a policy measure might have on general mobility as on the possibilities and instruments which are available to implement such a measure, the following factors having been

Table 4 - Modal Split Foreign Holidays

	Variant III air included			Variant IV air excluded			change 1980, 1985, 1990
	1980	1985	1990	1980	1985	1990	
<i>Camping</i>							
- car	27,9	26,4	24,8	33,0	31,4	29,6	+ 2,2
- other	2,2	2,2	2,1	2,9	2,9	2,8	+ 9,1
<i>Other types of holidays</i>							
- plane	17,2	17,4	17,8	-	-	-	-
- car	35,1	36,1	37,2	42,3	43,5	45,0	+ 26,8
- train	8,8	9,4	10,1	11,3	12,1	13,0	+ 40,9
- bus	5,8	5,6	5,3	7,5	7,2	6,9	+ 53,4
- other	3,0	2,9	2,7	3,0	2,9	2,7	+ 6,6

**Table 5 - Changes in mode, due to suppression of
airtransport mode type of holiday**

<i>Camping</i>	
- car	+ 30
- other	+ 4
<i>Other types</i>	
- plane	- 100
- car	+ 41
- train	+ 15
- bus	+ 10
- other	+ 0

considered, viz. quota restriction, price measures, measures of aviation politics and licencing systems. Here, too, the possibilities of retraining non-business traffic have been reviewed. A major difficulty in this connection, however, is the fact that an increasingly growing proportion of this traffic takes place on normal scheduled services also catering for business traffic, and it will certainly not be intended to frustrate the latter category, in view of the significance of international commercial traffic to the Dutch economy (a large percentage of the Dutch GNP is achieved through international trade). By way of tackling the non-business traffic sector accordingly not only holiday charter transport but also the service level of scheduled traffic will be affected. Moreover, aviation political consequences will no doubt crop up owing to foreign airlines getting fewer chances than before with, in consequence, further impairment of scheduled traffic. In general the conclusion therefore was that there were only few instruments qualifying for achieving the desired result, i.e. restraining part of the air traffic: the instruments either operate unduly rigorously thus defeating the object to be attained (quota restriction, licencing, aviation politics) or they were insufficiently effective.

An instance of a low-effect instrument was price setting. In fact the government and the airport authorities can only exert influence on a minor part of overall flying costs, i.e. by way of landing charges. An analysis of the possible consequences of a drastic increase of landing charges (by 50%) led to the conclusion that this would produce only marginal effects, both on scheduled and charter traffic, i.e. of the order of 0,5% on long hand and appr. 2,5% on short distance. [5] This is partly due to the relatively small proportion of airport charges in overall flying costs, since landing charges represent only some 6% of flying costs, so that a 50% increase will lead to an increase of only 3% of flying costs, the effect of the price elasticity consequently being limited, partly this is also due to the competition among airlines which may tend to part of the increase not being passed on, thus reducing

the returns to the airlines, which may possibly induce airlines to transfer their services to other airports nearby offering more favourable terms. However this effect on further analysis also appeared to be extremely weak. The conclusion of this approach therefore was that even if it should be contemplated to try to restrain air traffic, the possibilities for this are limited and that the consequences of such a measure through the modal split effect might well counteract other policy measures such as restraining road vehicle traffic.

4.5. Correlation between the studies

It is clear that the studies described above correlate with each other. This is partly due to the fact that there is a causal connection (for instance between the Second National Airport study and the study of the Regional Airfields), partly also because when a study was submitted to policymaking authorities, new queries were called forth, which again led to further studies (for instance Second National Airport and restraining of air traffic demand). As a matter of fact the comprehensive approach had not been planned in advance, but rather grew as a gradual process following the consistent consultations between researchers and users, as described earlier.

The ultimate result of this gradually grown situation is a set of consistently linked up models, with which several intermediate variants of the aforementioned solution potentials may be solved. Thus situations may be imagined in which no major second airport will be constructed, but a new, relatively favourably located regional airport in addition to Schiphol and the existing regional airfields. It may then be assessed with the aid of a combination of the SNA-model and the model for the regional airfields what will be the effect of such an airport on airport capacity in the Netherlands. By the same token situations with a SNA, closing down of one or more of the regional airfields and, for example, closing of Schiphol, can be worked out. It will be clear that this system of models may in theory constitute a significant aid in the further decisionmaking processes in respect of airport capacity in this country. Fortunately this turns out to be the case also in practice. The results of the studies have been submitted to the policy-making bodies, following which elaborate discussions ensued. The queries and problems arising from these discussions were fed back to the researchers who with the aid of the instruments developed appeared to be able to answer at short notice the majority of the problems posed.

The questions asked ranged from e.g. the influence of lower or higher forecasts, the calculation of the business economic returns in the case of one airport or in a system of two airports, the passenger load factor of railways under various alternatives, the expected volume of em-

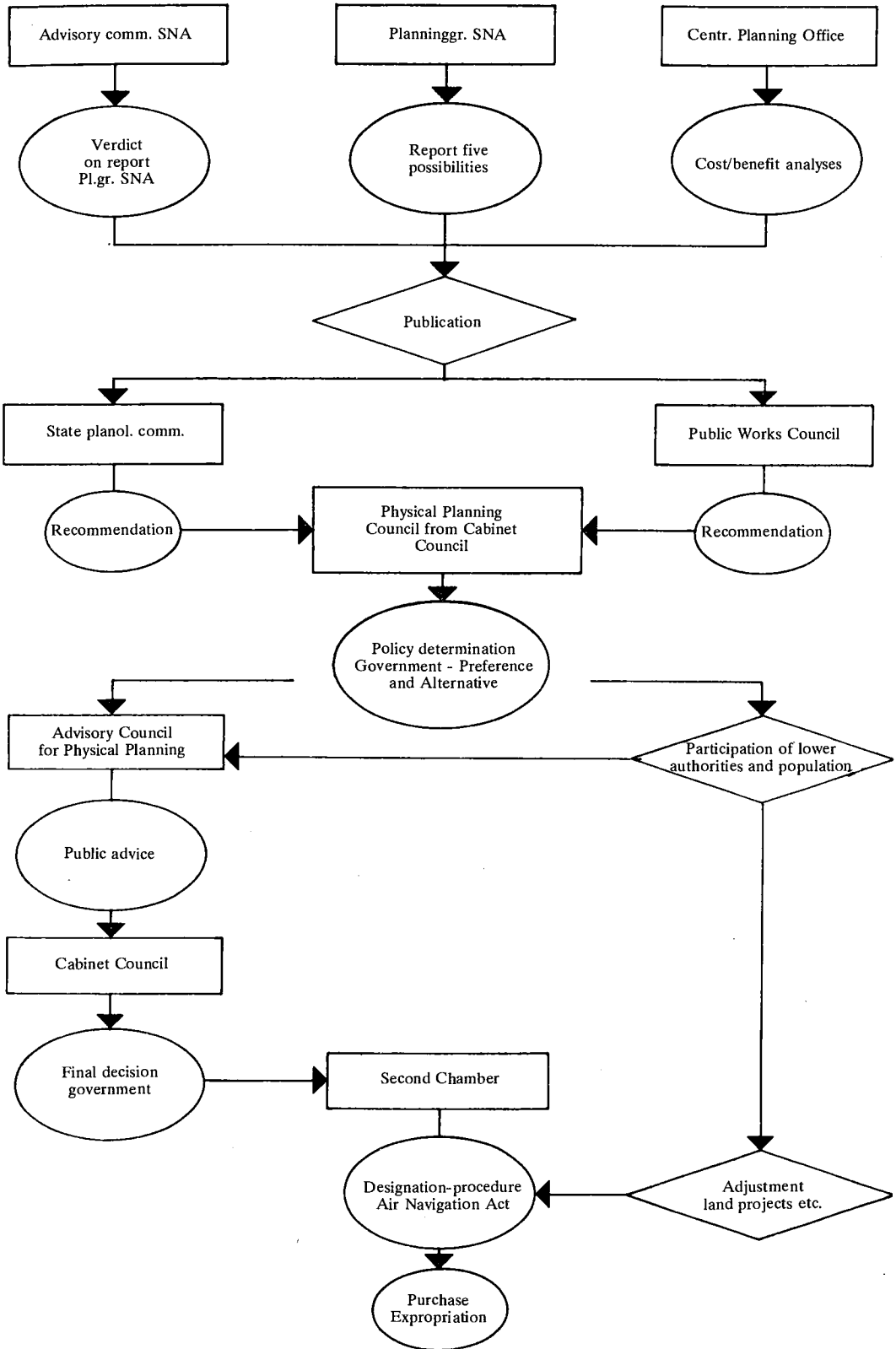


Fig. 5 - Procedure of participation of choice SNA

ployment in varying assumptions in relation to productivity, the influence of technical development on noise production and aircraft size and thus on the number of air traffic movements to be expected, etc.

From the utilization of and the response to the instruments developed we think it may be concluded that the design and framework of the studies and the mode of tackling the problems, in which already in the course of the phase of study the participation and involvement of future users is ensured, has been a success.

The model system developed has turned out to be a policy information system not only in theory, but it has also appeared to be used as such in practice, which for the user leads to alertness in his evaluations and for the researcher to a considerable amount of satisfaction in his work.

5. THE FURTHER PROGRESS: POLITICAL DECISIONMAKING AND THE EFFECT OF THE STUDIES THEREON

Although the studies have undoubtedly influenced the forming of opinions, this does not mean that the ultimate decisionmaking will be completely based on the results of the studies. Also there is still a long way to go before a definite decision on airport capacity in the Netherlands will be forthcoming. The relevant decision process is of a rather complicated nature (see fig. 5) which up to now has been gone through only halfway. It is to be anticipated that as further progress in this process is being made an increasingly growing number of arguments will emerge, which cannot be answered any more with the instruments developed. Nevertheless it may be said that on the basis of the studies the initial problem, with all the alternatives still open, has been reduced to a substantially simpler problem, current alternatives essentially having been narrowed down to the following:

a. Extension of Schiphol by a fifth runway – approx. 50,000 additional air traffic movements.

b. Construction of a SNA: Of the original 5 locations only 2 have remained as more or less viable alternatives. It is contemplated that one of these two locations be reserved. The decision to effectuate construction may

then be postponed until a clearer insight into the way and the rate at which traffic is likely to develop has been gained. Should this remain small, it will always remain possible to opt for an extension of Schiphol.

c. The solution through the regional airfields offers only limited possibilities and is only appropriate as an interim solution.

d. Restraining of the demand is considered as a serious alternative by only very few people.

When reviewing the overall picture we think it may be said that in spite of the fact that the aims of the various bodies co-operating in the study did not always run parallel, in the elaboration of the various alternatives such harmony of consultation has prevailed that the remaining aspects of the problem have become comparatively simple. Naturally this does not mean that in the further decision process conflicting objectives could not emerge again. By way of the continuous co-operation structures it is nevertheless likely that a greater mutual understanding for each other's viewpoints also in this stage will be found than if the parties involved had directly and one-sidedly been confronted with the results of the study.

The framework is there for consultations on new aspects of the problem to be pursued in a positive and constructive consultative atmosphere.

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Development of regional airfields and Schiphol

	Schiphol	Rotterdam	Maastricht	Twente	Groningen	Eindhoven	
1973 (actual)	92	7	0,9	0,2	0,1	–	100
1980 (forecast)	75	13	1,9	3,4	2,2	5,8	100
1985 (forecast)	76	11	2,4	3,5	2,7	5,5	100

x 1 million

80

70

60

50

40

30

20

10

0

1965

70

75

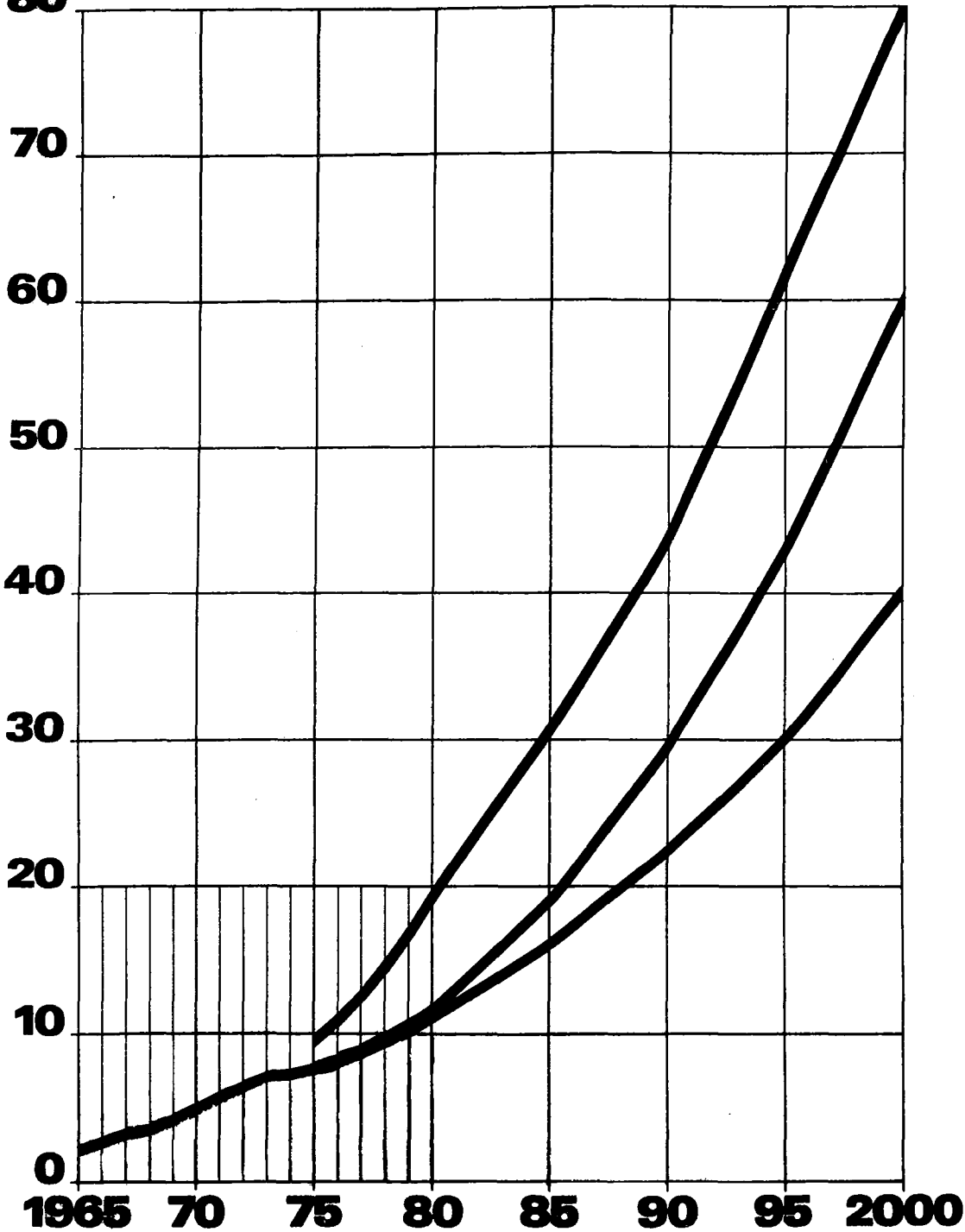
80

85

90

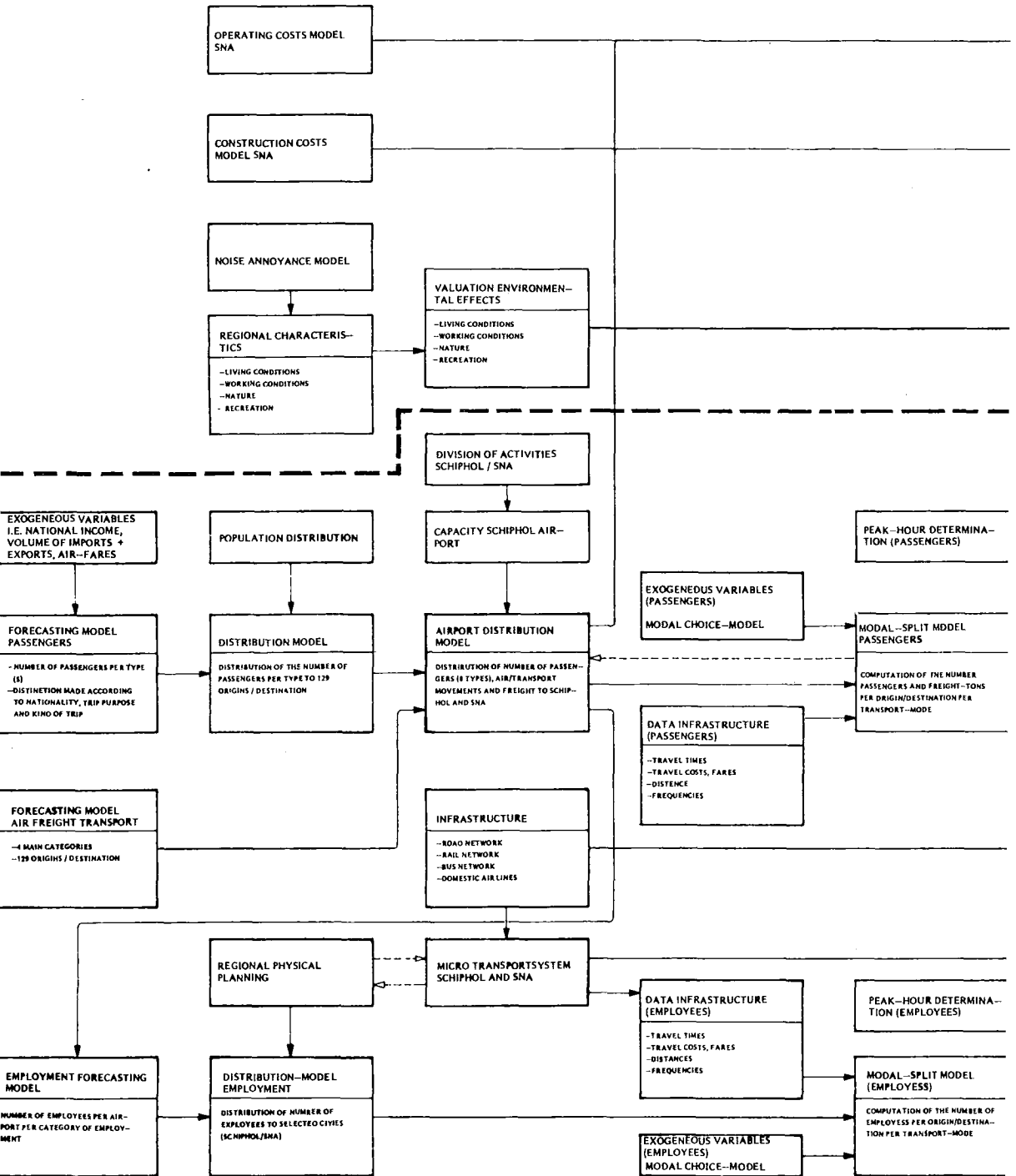
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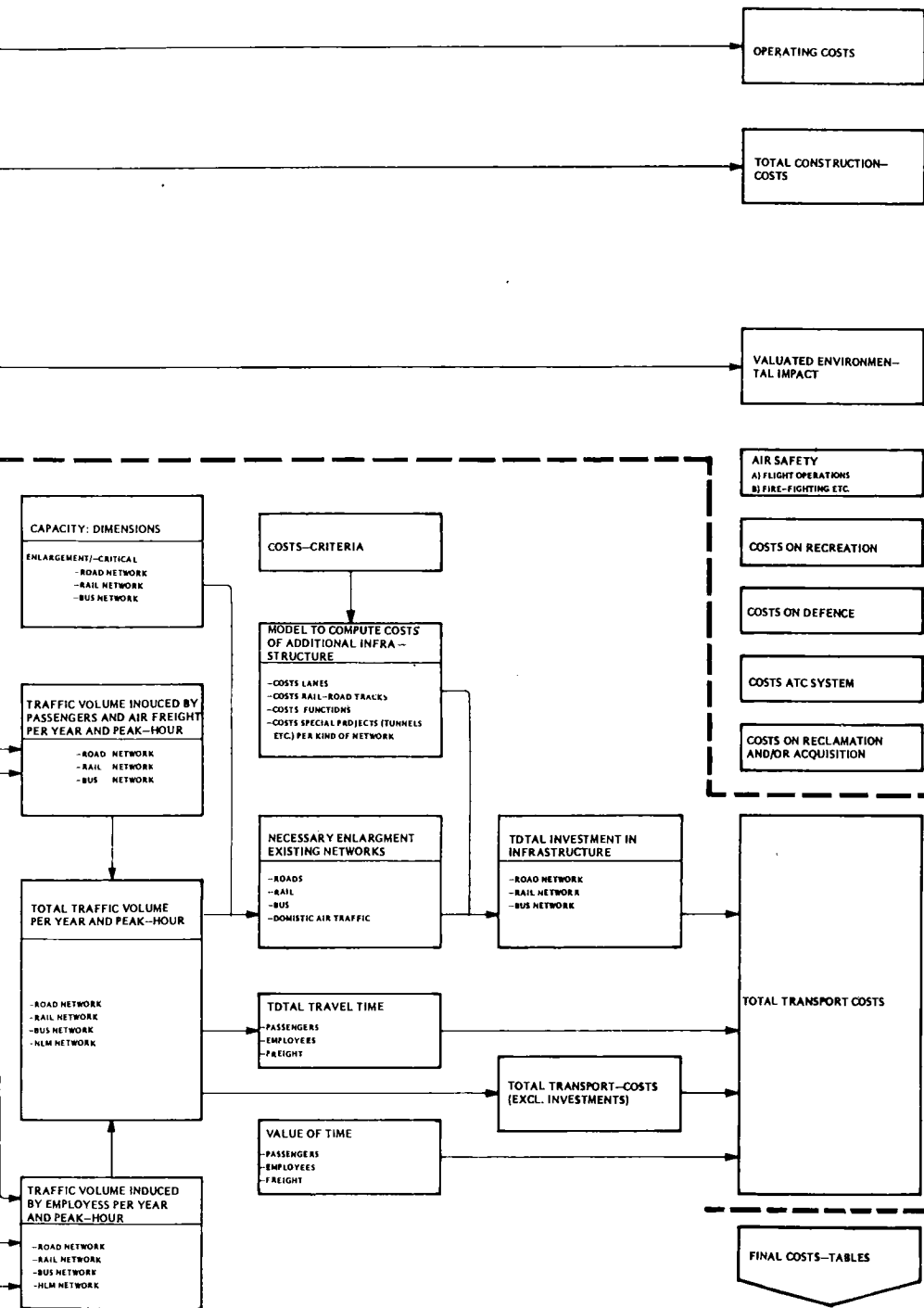
2000



FORECAST OF PASSENGER MOVEMENTS
(excluding direct transit)

ANNEX 1





----- traffic model.