

**ITQs IN THE NETHERLANDS:
TWENTY YEARS OF EXPERIENCE**

by

Pavel Salz

Abstract

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The Netherlands has introduced ITQ's in 1976, even before the very start of the negotiations on the future CFP. The objective of the paper is to review the Dutch fisheries management and the role which ITQs play in it today. The Dutch ITQs are defined as a share in national quota of sole and plaice. They are freely tradeable and fully divisible. After a transitional period of several years, the compliance is very good today. The industry prefers to maintain the system in the years to come. However, ITQs have not prevented a fall in the level of the plaice stock. ITQs allow primarily distribution of production opportunities. They are not an instrument for stock conservation, which depends on the set TAC. ITQs must be supplemented by other measures within comprehensive fisheries management. The paper presents first a brief historical review of the Dutch fisheries management. Second, the role of ITQs in the current management system is explored. Third, the merits of ITQs are assessed in terms of their characteristics and in relation to stocks, economics, and institutions. Finally, three major theoretical assumptions regarding biology, economics and institutions are confronted with empirical evidence. It appears that these assumptions are unrealistic and therefore unjustified. Optimistic expectations regarding the potential of ITQs should be reassessed in that light.

Keywords: CFP, economics, institutions, ITQs, management, Netherlands

Pavel Salz: LEI-DLO, Fisheries Division, Burg. Patijnlaan 19, 2585 BE The Hague, The Netherlands, [tel: +31-70-3308135, fax: +31-70-3615624, e-mail: p.salz@lei.dlo.nl]

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1. INTRODUCTION

Recently the concept of ITQs seems to enjoy an increasing attention¹. Possibly because of the disappointing results of the fishery management schemes applied over the recent decades, at least in the European Union. In the EU most major commercial stocks are overexploited. The 'Lassen report' recommends a cut in fishing mortality by 30-40% (Lassen, 1996). At the same time the economic results of many fleets are poor due to poor catches as well as depressed prices. The low fuel price and the share remuneration system of the crews has saved many fleets from bankruptcy. This paper aims to discuss the experience of the Dutch ITQ system and put it in a broader perspective of fisheries management in general. The latter extension seems of importance because the specific characteristics of the Dutch flatfish fisheries may not be encountered elsewhere. The paper is composed of four major sections. First, the history of Dutch ITQs is discussed briefly. Second, the role of ITQs in the current management system is explored, particularly in relation to management by effort and co-management. Third, pros and cons of the Dutch ITQ system are put in a broader perspective. The merits are assessed in terms of the characteristics of ITQs and in relation to stocks, economics, and institutions. In this section it is shown that ITQs cannot resolve all the problems, but that they may be effective as a component within a comprehensive management scheme involving also restriction on fishing effort and a strong co-management component. Finally, three major theoretical assumptions regarding biology, economics and institutions are confronted with empirical evidence: precise indications of TACs are not available, institutions are not very effective and fishermen are not strictly economic beings.

What is an ITQ?

The term ITQ has been introduced to the discussion of fisheries management a long time ago in relation to rights based allocation systems (Warming 1911). Today, all too often it is assumed that the meaning of the concept of ITQ is unambiguous. That is not quite the case. For each of the three words there may be various interpretations, which depend on the characteristics of a specific situation.

The term 'individual' is often interpreted as a fisherman, a vessel or fishing company. In practice it is a 'legal person', an entity allowed to hold property. This may be a bank, a post box company or a consortium, etc. The individual is defined in the general and possibly also in the fishery specific legal framework of a country.

The term 'transferable' alone does not specify the wide range of nuances which may vary from total freedom to non-transferability. How can ITQs be transferred, when and under which conditions - these are just a few questions which have to be dealt with in an operational ITQ system.

Transferability without further specification leaves many questions unanswered.

Finally, the term 'quota' has been traditionally given two meanings: either an absolute quantity of fish expressed in kilos or percentage share in a TAC. Quota are further specified in terms of species, time period, area, etc. Furthermore, quota do not necessarily have to relate to a quantity of fish, but equally so it may be an allocation of value (Willmann, 1995) or fishing effort (de Wilde, 1993). It follows that the term 'ITQ' is not an unambiguous concept. Its precise specification may have far reaching theoretical as well as operational implications. Introduction of ITQs in a specific situation calls for appropriate definition depending on the pursued management objectives as well as on the precise conditions of the fishery.

The definition of ITQs applied in the Netherlands is a 'percentage share of the annual national quota of sole, plaice, cod and whiting in the North Sea'. Today, ITQs cover over 90% of Dutch cutter fisheries, with the exception of coastal shrimp fishing. The paper deals largely with beam trawling on sole and plaice. Roundfish ITQs were introduced only in 1995 and are economically only of marginal importance.

¹ICES Study Group 'The Management Performance of Individual Transferable Quota (ITQ) Systems.; Intern. Workshop on Assessment of harvest quota in fisheries, Norway, 7/96; Workshop on property rights, Reykjavik, 7/95; etc.

2. BRIEF HISTORY OF THE DUTCH MANAGEMENT SYSTEM

The chronological overview of Dutch fishery management measures outlined in appendix 2 illustrates that fisheries management in general and implementation of an ITQ system is a continuous process of adjustment to new situations which arise from the actions and reactions of the administration and the industry (Davidse, 1994).

There is little reason to expect that the fishermen will stick to their ITQs unless a solid monitoring system is put in place. However, control of landings of individual vessels (and in Holland there were only about 600 fishing boats, with just 11 landing places!) is rather costly. The administration then searches for a more cost effective way to make sure that the ITQs are not exceeded. Restrictions of effort have been chosen and greater responsibility has been given to groups of fishermen in order to create a greater sectorial support for fisheries management in general.

Implementation of appropriate legislation was not feasible within a short time span. Individual fishermen and their legal advisors questioned the validity of new regulations in courts and in the beginning with a certain success. In some instances legal procedures against the state were started in order to delay the introduction of a new measure. Long backlogs of court cases against offenders developed, some cases verdict being given two years after the offence itself. The level of fines became uniform only gradually.

The administration could not legally guarantee that every vessel would be allowed to exploit fully its ITQ. If other vessels overfished their ITQ to an extent that the national quota was fully utilized, the fishery had to be closed under the EU obligations. Fishermen who overfished their ITQ were cut accordingly in the following year, so that those who underfished it could be 'compensated'. Direct financial compensation would have had to go through private legal procedure against those who overfished. It never took place in practice.

Throughout the entire period there was a continuous drive within the sector to construct larger and more powerful vessels. Until 1986 there was a fiscal facility which subsidized investments up to 12% of their value². After that year all investments had to be made on fully commercial terms. Until the introduction of the 2000 hp limit, vessels of up to 4-4,500 hp were built. They offered greater safety and fishing was possible almost independently of weather conditions. Investments were often made for fiscal reasons during years of good profits. Furthermore there was a lively trade in second hand vessels. A 5-10 year old trawler would fetch an attractive price facilitating for an investment in a new one (Davidse 1991).

Construction of new and larger vessels obliged the vessel owners to acquire additional ITQs. Particularly the larger vessels were obliged to make heavy investments in fishing rights as their original allocation was not sufficient for a profitable operation. Throughout the period the price of ITQ amounted to some 80-100 NLG/kg of sole and about 7-10 NLG/kg of plaice³. This may be compared to average auction prices (1990-1995) of sole between 13-16 NLG/kg and plaice 3-4 NLG/kg. Investment in ITQs became also an interesting alternative in a situation of good results, when investment in a new vessel became impossible due to the restrictive licensing scheme.⁴

Since 1988-89 the value of ITQs was recognized by the fishermen as a guarantee for long term survival. The intensity of trading increased. Particularly those owners who increased the size of their vessel since the allocation of ITQs in 1977 were in need of additional rights. Their requirement was in some cases a double of what they actually possessed in ITQs (Davidse 1988). The trade resulted in on-going concentration of ITQs in specific fleet segments. Decommissioning of vessels involved in the mixed fisheries (mainly otter trawlers fishing for codfish and flatfish) freed ITQs which were acquired by larger companies exploiting beam trawlers.

²This was a fiscal deduction on profit. If a company did not make any (or sufficient) profit it could not make use of this deduction.

³These are relatively high prices in relation to the auction price. This situation occurs because in fact only marginal quantities are traded, i.e. a fishing company does not have to acquire an entire ITQ required for its operation. Rather it buys only an additional quantity to achieve profitability.

⁴In profitable years, investments increase costs and consequently reduce taxes to be paid. It is more attractive to increase the value of own company through investments rather than to pay the taxes.

Table 1. Concentration of fishing rights

Fleet segment (hp-group)	Mid 1988			January 1996		
	Number vessels	Aggreg. power 1000 hp	% sole quota	Number vessels	Aggreg. power 1000 hp	% sole quota
<260**	141	26	1.0	109	21	2.2*
261-300	125	37	4.7	134	40	8.5
301-1500	201	205	38.5	43	42	6.9
>1501	139	320	55.8	171	386	82.4
Total	606	588		457	489	

Source: LEI-DLO and Min. of Agriculture

* This includes ITQ 'parked' on small vessels, which are in practice exploited by the large ones.

** This group includes a number of shrimp vessel, which do not participate in the flatfish fishery.

The concentration of ITQs in fewer hands and rationalisation of the fleet was a result of a number of processes. Increasing level of fines forced vessel owners to invest in fishing rights. The opportunity of collecting a decommissioning premium made some vessel owners to decide to stop fishing. Some vessels stopped also because the administrative regulations became too much for them. A trend towards concentration (drop in number of active fishing vessels) would have taken place also without ITQs, but possibly little more slowly.

The owner of a decommissioned vessel was allowed to sell his ITQ separately and he could also sell the vessel itself as long as it would leave EU fisheries altogether. Contrary to other EU Member States the vessel did not have to be destroyed physically. The capital value of the companies increased substantially so that decommissioning became a rational economic choice⁵.

The licensing system restricted investments in new vessels. The licenses of vessels which were decommissioned were withdrawn, so that free licences became only available when a vessel was sold outside the Netherlands (reflagging) or put to another use (e.g. sport fishing).

3. CURRENT SYSTEM: ITQS, EFFORT AND CO-MANAGEMENT

Effective compliance with the EU quota regulations was since 1986-87 the major issue of concern for the Dutch administration. Detailed controls of landings required substantial effort, despite the relatively simple situation - small fleet, few landing places, most quota in only one ICES-area (North Sea). The encountered problems were:

- physical overcapacity of the fleet, causing continuous pressure towards overfishing of ITQs;
- excessive weight in the boxes;
- too frequent trade in ITQs making continuously up-dated administration difficult;
- timely coordination between the controllers in ports (Min. of Agriculture), prosecution (Min. of Justice) and courts;
- poor relations between the administration and the professional organizations;
- necessity to comply with the objectives of MAGP III, reduction of total capacity by 15%, either through size of the fleet (minimum 8.25%) or through restriction in activity (maximum 6.75%).

These problems were tackled by introduction of effort restrictions and in 1993 implementation of a co-management scheme.

⁵ Without this additional value, many companies would not have been able to stop fishing and maintain a positive capital balance for the owner, after reimbursement of all debts. On the other hand, decommissioning was forced upon them by the restrictive management system.

Effort restrictions

Restriction of fishing effort was introduced as a supporting measure to prevent excessive overfishing of the ITQs. First, this restriction was formulated in terms of obligatory number of days in port. However, the effect of this definition was limited. The usual fishing pattern of the Dutch beam trawlers is week fishery from Monday till Friday. As reaction to the days-in-port, the fishing weeks were extended over the weekend and the net effect was negligible. Therefore the policy shifted to restrict the number of days-at-sea (DAS). This restriction had to be directly linked to the ITQs, because the vessels had to have the opportunity to exploit fully their fishing rights. A method was developed by LEI-DLO to allow for such link (De Wilde, 1993). This method is based on the following formula:

$$\text{Days}_t = \left\{ \left[(\text{ITQ}_t / \text{Quota}_t) * (\text{Price}_{\text{ref}} * \text{Quota}_{\text{ref}} * A_t)^{\text{sole}} + \left[(\text{ITQ}_t / \text{Quota}_t) * (\text{Price}_{\text{ref}} * \text{Quota}_{\text{ref}} * A_t)^{\text{plaiice}} \right] \right\} / f_{\text{ref}}$$

Quota=	National quota, which follows from TAC and possible swap with other Member States
ITQ =	quantity in kg of the species in the current year
A =	Abundance factor, corrects for change in catchability in relation to change in quota
f =	average revenues per fishing day of a vessel with the given engine power (based on an statistical relation)
ref =	average value for the 3-year reference period t-2 to t-4
t =	current year

Relative changes in abundance, factor A, was introduced in 1996. Factor A accounts for the different rates of change of the stock and the TAC. If A=1, the formula assumes a constant partial fishing mortality at the status quo level. The average technological progress is reflected in the function which determines f. Technological progress of an individual vessel for which the number of days applies is not taken into account (e.g. through an age factor). The main advantage of the application of this formula is that it was from the beginning well accepted and supported by the administration as well as by the industry. (For detailed elaboration of this formula see appendix 3.)

Some further ad hoc adjustments are introduced for vessels involved in other fisheries than the flatfish. In order to promote regular fishing throughout the year, the DAS-allocation was also specified by 3-months periods. In this way regular price formation and availability of fish till the end of the year was almost assured.

Co-management groups

Trade in ITQs (buying and hiring) has at times produced a fair amount of confusion for the administration, which made it impossible to effectively control individual vessels at any given moment in time. Consequently, no trading for the current year was allowed after September or October of that year. The up-take accounts could than be consolidated in time before full exhaustion of the national quotum.

It was gradually becoming evident that the political commitment for intensive control of landings may become gradually eroded. Greater involvement of the industry itself would be the only guarantee for an effective future management. The major question was 'What advantages could a co-management system offer to individual fishermen?'. This question was resolved with a kind of 'carrot and stick' policy. The carrot was that the co-management groups would be given greater freedom of trade in ITQs. The stick implied that if the sector did not manage to organize at least 75% of the fleet in these groups the government would impose an obligatory decommissioning scheme.

The co-management groups⁶ were given the responsibility to manage the total ITQs of their members. No limits were imposed on trade within the group. Temporary trade (hiring en renting) between the groups is allowed until the end of November. Within a group trading can go on till the end of the year. Individual vessels not pertaining to any group may not hire/rent ITQs after end of February. Selling/buying is allowed continuously, but in the course of the current year ITQs cannot be withdrawn from a group. However, permanent as well as temporary transfers for the current year are only allowed if the vessel has not yet exploited more than 90% of his ITQs. In this way the groups offer substantially more flexibility to their members. At the same time, the groups must stay within their aggregated allocation. The managers of the groups must follow the up-take of the ITQs of their members. Overshooting of an ITQ takes place at the expense of the group as a whole. The rules of

⁶ Detailed discussion of the Dutch co-management system may be found in Smit (1995) and Hoefnagel (1995a+b).

the group stipulate the required compensation procedure - usually a certain amount per kg/species is than withheld. In this way the government deals today with only 8 groups instead of fishing vessels. The issue of compensation is resolved by a private arrangement within the groups.⁷

The threat of obligatory decommissioning was a legally interesting question. The government may not stop the operation of any company just for generic reasons. Therefore, the government intended to withdraw annually a certain percentage of the licences. All licence holders would be affected proportionally. Those vessels willing to continue their operation would be obliged to buy free licences on the market. In this way, first the existing buffer of free licences (about 2-4% of the total) would disappear. At the same time the price of licences would be driven up and some vessel operators would choose to sell their licence and stop fishing. With some 95% of the fleet joining the groups and the groups operating effectively, this measure did not have to be taken⁸.

The groups were installed at a time of relatively good economic results. Some sceptics have expected that once the results deteriorate the individualistic behaviour of the skipper-owners will lead to a break-down of the system. However, despite the substantial decrease of particularly plaice quota in 1996 the groups remained unthreatened. Although effectively not much ITQs can be traded in 1996, because of an overall shortage, vessels remain in the groups because of the potential role from which they may profit. Co-management is in this case not a matter of ethical solidarity within the sector, but rather a rational decision based on commercial and other considerations.

4. EVALUATION: PROS AND CONS

Below, the evaluation is presented from several perspectives. First, the Dutch ITQ system will be assessed on the basis of six general characteristics of property rights formulated by Scott (1989): flexibility, transferability, exclusivity, divisibility, duration/validity and quality. Subsequently, the ITQs are evaluated on the basis of a methodology which may be applied to assessment of effectiveness of fishery management measures from the biological, economic and institutional perspective (Salz, 1996).

4.1 ITQs as property rights

Scott (1989) distinguishes six characteristics on the basis of which the quality of property may be assessed:

- flexibility = extent to which the use of the rights is or is not restricted (possibly also by other measures);
- transferability = possibility to sell or hire, i.e. definitive or temporary of change of ownership;
- exclusivity = unique right of use, i.e. ownership is not shared with others
- divisibility = right may be divided into smaller parts, e.g. to sell separately or to spread its use over time;
- duration= conditions to the validity in time;
- quality = legal security on which the owner can rely in respect to the above characteristics.

The pros and cons of these characteristics may be perceived differently by different actors, i.e. government, professional organizations and/or individual fishermen, depending on the precise situation of the fishery and the division of management responsibilities. The Dutch system of ITQ's for flatfish could be assessed as follows (see also papers by Davidse):

Flexibility

⁷Previously the government was in some cases sued for compensation payments (although unsuccessfully) by fishermen who had to stop fishing before they could take their ITQ, because the national quota was exhausted.

⁸ The operation of the co-management groups had to be evaluated after three years at an explicit requirement of the Dutch Parliament. (Smit, 1996).

The system is very flexible. The ITQs may be exploited at any time during the given year. They may be traded at will, although not necessarily to be used during the same year, depending on the time when the trade took place.

This flexibility is in general appreciated by the industry. In the past the administration had some problems to register trade in ITQs in real time and consequently problems arose in respect to effective control. These problems have been resolved.

Divisibility

The ITQs can be divided and at will according to the precise needs of demand and supply.

Transferability

The ITQs may be transferred only to companies which are already in possession of a fishing licence. However, not only real fishing companies, but also banks or ship yards may hold an ITQ, although only temporarily. Transferability is restricted for those individual firms who do not participate in the groups. They may not acquire rights for the current year after the end of April. ITQs acquired later may be only used in the following year. Members of the co-management groups may trade freely within the group till November.

The underexploited ITQs in one year cannot be transferred to the next.

Once some kind of property right is institutionalized it proves difficult to effectively prevent trade in that right because of a broad spectrum of options of co-ownership. This applies also to attempts to restrict transferability, e.g. from one region to another⁹.

Transferability is major advantage for economic efficiency. Some companies will decide to sell their ITQ while others are in the position to assure their continuity by acquiring them. In the Netherlands it is the fishing companies themselves which hold the ITQs required for their operation. Concentration of ownership in the hands of large processors, which is the experience in New Zealand (Faloon, 1993), did not occur and there are also no indication that such a development will take place in the foreseeable future.

Exclusivity

The ITQs are an exclusive property of a specific fishing company. The exclusivity is maintained also within the co-management groups.

In practice exclusive access to a fishery protects those who have been participating in it previously. At the same time it forms a major obstacle for new comers to exceed. Introduction of ITQs makes historical performance in the fishery 'from one day to the next' a major capital asset (Harmsma, 1993). Although the creation of wealth 'out of nothing' is not at the expense of any other party, it is only to the benefit of a very specific, small group.

It may be that the exclusivity introduces a certain rigidity into the system as open competition is not possible.

Duration

The ITQs are specified as a right to land a specific quantity of fish in a certain year, based on a percentage share in national quota. The duration of the relative share is in principle unlimited. An elimination of these rights would be for the government probably very costly, because of the indemnities which would have to be paid. ITQs have made private property out of a common resource.

Still, with the possible review of the CFP in 2002, there are doubts whether it will be possible to continue the existing system. Particularly the banks, as far as they have financed investments in ITQs, expect the resulting reimbursements to be made before 2002.

Quality

The legal quality of the ITQs is not perfect. Overexploitation of ITQs by some vessels will be at the expense of others. Some indemnity is agreed upon within the groups.

Decrease of the herring TAC in June 1996 has seriously affected many vessels, some of which already took half of their ITQ. Possibilities of compensation are being explored for this special case.

⁹This is clearly demonstrated by acquisition of track records in the UK by Dutch and Spanish vessel owners, as well as by experiences in Iceland attempting to maintain quota in designated regions.

4.2 Biology, economics and institutions

In a multidisciplinary evaluation of multi-species and multi-annual fishery management measures, Salz et.al. (1996) have specified 21 criteria in the basis of which biological, economic and institutional merits or these measures were evaluated. Summary of these criteria is presented in Appendix 1.

Biology

Four major criteria may be distinguished from the biological perspective: fishing mortality, effect on spawning stock, upgrading and discarding. The effect on ecosystem could be considered as a fifth criterion, although it is less directly related to the issue under consideration.

The major question regarding ITQs from biological perspective regards their effect on fishing effort and thus on fishing mortality. The Dutch evidence shows that the aggregate fishing effort depends on the productivity (catch/day-at-sea) and the level of TACs. However, productivity does not only depend on the state of stocks, but also on various other phenomena which affect the behaviour of the species.

It may be expected that the ITQs make fishermen more aware of the fact that they are exploiting a common resource and how far they may go in that exploitation. However, the problem of fisheries management is not only at the level of individual compliance, but equally at the level of overall fishing opportunities. Compliance with rules (ITQs or other) will only improve if it is supported by appropriate system of control and effective prosecution (chances of getting caught and level of fines). Therefore there is little reason to expect that the ITQs in their own right will contribute to an improved state of stocks. Maintaining the size of the spawning stock above MBAL depends on the level of total TAC, rather than on the existence of ITQs. The same applies to fishing mortality.

Effect of introduction of ITQs on upgrading depends on the specific situation. If the catches are too high, it may be economically quite rational to keep on board only the sizes with the highest unit value. Only if the productivity (e.g. catch per day) is in fact too low can it be expected that upgrading will be reduced, as compared to the pre-ITQ situation. Discarding of non-commercial species will depend on the amount of fishing effort and not on the existence of ITQs.

A major question in a multi-species fishery regards the possibility of a species mix within ITQ which would be comparable to the realized catches and which would meet the stock management requirements in terms of fishing mortalities of the individual species. The Dutch data demonstrate that an appropriate choice of seasons and/or fishing grounds does substantially affect the mix of species in the catch (Dol, 1996). However, this does not mean that this is also feasible on aggregate level. As stated above, the Dutch situation is relatively simple: two species represent some 70% of all economic interests. Roundfish and herring are of major importance for only few companies. Existence of ITQs for cod and whiting allowed the beam trawlers to buy them and to land cod which is caught as bycatch.

In the Bay of Biscay or other areas where a much more diverse production is the rule of the day, the problem may be manifold greater.

After the substantial reduction of plaice quota in 1996, there are indications that the fishing effort has been reduced and that the fishermen are exploiting fishing grounds where an appropriate mix of sole and plaice can be caught. Statistical data will become available only in the beginning of 1997.

Economics

From the perspective of economics, two types of aspects could be distinguished. First, there is the view point of an individual enterprise. Processes at this level determine the behaviour of individual fishermen. Second, there is the macro economic view of the society. The first view is discussed in this section. The second one is reviewed in the subsequent section dealing with policy and institutions.

Six criteria can be applied from the economic point of view: short term flexibility, long term planning, market consistency, relation to daily practice, affect on race for fish and influence on economic performance.

In the Dutch case, it is not clear whether the ITQs have restricted the flexibility of the fishing vessels. The choice of where, when and what to fish depends on the composition and size of the available ITQ. E.g. fishing grounds have to be selected according to the available mix of plaice and sole. The groups are obliged to prepare annual fishing plans. Many individual companies attempt consciously to spread out their ITQs over the whole year.

The influence of ITQs on long term planning, particularly investment decisions is ambiguous. On one hand, the companies assess their investment plans in the light of their fishing opportunities.

Investing in additional ITQs is an explicit consideration. ITQs in combination with licences have prevented undesirable expansion of the Dutch fleet. On the other hand, however, there are doubts whether the ITQ system will be maintained beyond the year 2002. This is a reason for certain cautiousness, particularly on the part of the banks.

Existence of ITQs is certainly consistent with the functioning of a market economy. ITQs give 'right to stream of benefits' (Bromley, 1991) and as such they should have a price which would reflect these benefits. When ITQs are properly enforced, they function as an incentive to rationalize the fishing operations. A problem in this respect is that if the fishing companies would be obliged to acquire all of their necessary fishing rights¹⁰, the production costs would increase substantially. This increase could not be recovered through higher prices (because these depend on supply and demand and not on costs) so that the performance of the vessels may seriously deteriorate.

In some situations, the composition of ITQs according to species may diverge from the daily practice where the composition of catches may be quite different. Due to flexible trading opportunities in the Netherlands, this has not yet been a serious problem. However, in fisheries where the vessels depend on a larger number of species, the specification of an appropriate mix within the ITQ may not be as simple (Squires, 1996).

ITQs require an as equally effective enforcement as any other measure, i.e. level of prosecution must be prohibitive to offenders, if they are to restrict the race for fish. In the Netherlands, for many years prior to 1988/89, ITQs were not much more than 'just another piece of paper'. In such a situation fishing continues without restraint.

Finally, the question may be raised of how do the ITQs affect the commercial performance of the fishing companies. Also in this case a clear cut answer does not exist. This evidently depends on the conditions of the situation without ITQs. The Dutch experience shows that within a relatively short period of 5-8 years (1988-1995) a substantial rationalisation of the fleet has taken place. Most medium sized vessels involved in mixed fisheries (roundfish, flatfish) have stopped their operation and preferred to sell their rights to the owners of large beam trawlers. Without ITQs those vessels might have continued fishing¹¹. The companies who have succeeded to stay in the fishery have so far obtained satisfactory results. Drive to capacity expansion (construction of new vessels) seems less intensive after a year of good results. However, as already stated above, if the vessels would have to pay for all ITQs, their results would have probably deteriorated.

Transfer of the fishing companies to the next generation may pose a problem because of the high capital value. Those who take over the company may be obliged to pay part of the capital to other heirs. Than they must 'earn' the total value of the ITQs.

Institutions and policy

When assessing the ITQ system from institutional perspective it is necessary to distinguish between national and EU considerations. Although current CFP does not make any explicit provisions in respect to individual fishing rights, reflagging by particularly Dutch and Spanish vessels to the UK has brought attention to this issue at EU level.

Therefore, within the EU following criteria may be used to assess the institutional implications of ITQs: political and sectoral acceptance, maintenance of relative stability, feasibility of enforcement, contribution to the development of local communities, application of subsidiarity and potential relevance for a future CFP beyond 2002.

An explicit political acceptance was not an issue in the Netherlands at the time of the introduction of ITQs in 1976, because at that time there was not much reason for conflict between the sector and the government. The system of allocation was adjusted to meet some specific objections of the industry. When the administration started enforce the ITQs effectively in 1988/89, a discussion about the principle itself was not relevant any more. It must be stressed that heavy pressure from the Parliament preceded tougher action from the side of the controlling agency.

¹⁰ Today most ITQs have not yet been traded, so that the companies possess substantial fishing rights for which they pay only in as far as they acquired ITQs in addition to their original allocation.

¹¹ In practice vessels often stop fishing after their bank refuses to provide further credits. The bank wishes to recover the liabilities, while the owner also preferably leaves the business with some capital left. Value of ITQs plays in this respect an important role.

The fishing sector accepted ITQs as a major instrument of fisheries policy only after it became clear that the administration was serious about its implementation. Gradual increase of imposed fines, coordination of prosecution by attorneys general as well as judges and the use of 120 controllers, all have contributed to the acceptance.

In the Netherlands, enforcement of ITQs was in the beginning difficult, but feasible because of relatively small fleet (some 600 vessels) and only eleven officially designated landing places. Unambiguous political commitment to an effective enforcement was realized after broad pressure from the Parliament. The expenses were substantial, running in the order of 10 mln NLG (about 4.5 mln ECU) annually in the years 1988-1991. This amounted to about 2% of the total value of the landings of the Dutch cutter fleet and to 5-6% of the total value added (labour and capital income). There was one controller for every 5 vessels or 20 fishermen! In 1994-'95 the number of active controllers was down to about 50-60, thanks to the effectiveness of the co-management system and computerized controls of auction sales.

The institution of the co-management groups and their active role in the management of the ITQs of their members has significantly contributed to improved relations between the sector and the national administration. The groups appear to be quite effective, although control at a higher level remains necessary. The groups themselves have little means to prevent distorted landings declarations by their members. The Dutch experience demonstrates that the subsidiarity principle is well compatible with the ITQ system.

The effect of ITQs on the local communities is uncertain. As long as ITQs are held by individual entrepreneurs, the community as such cannot prevent their sale to an owner outside that community. Consequently some communities will be net gainers and others net losers. Concentration takes place within the fleet as a whole as well as in regional perspective. Protection of local or regional interests will be at the expense of economic efficiency and probably difficult to maintain in the long run. This is also supported by the evidence from Iceland (Davidse, 1995b).

ITQs alone do not seem to be a threat to the relative stability. However, freedom of movement of people and capital within the EU contains implicitly the possibility that foreign interests acquire ITQs in a given country - reflagging is the case in point. In that case national quota are exploited by vessels under the national flag, but owned by foreigners. Secondary benefits for processing and trade may also accrue to another Member State. Even if international trade of ITQs is formally not permitted, relative stability is de facto not stable any more.

Introduction of private property rights in fisheries faces strong opposition in some Member States because of the danger of concentration in companies and regions and because it becomes more difficult for young fishermen to start their own business. Still, review of 20 years of experience with the current CFP and preparation of a policy beyond 2002, creation of an EU wide system of fishing rights (however these rights may be defined) should be given serious attention. If not for other reason, than only because international investment in general cannot be prevented and fisheries are not an exception in this respect.

Other considerations

Finally, ITQs may be assessed in terms of consistency, transparency and which new (unexpected) problems may occur.

Economic, biological and institutional consequences of ITQs will be consistent if there is the necessary commitment to their implementation. Evidently, ITQs cannot guarantee maintenance of stocks on an appropriate level, because that depends on the biological advice regarding the TACs. ITQs can only 'internalize' the scarcity of stocks, as expressed in quota. ITQs are only one way to distribute the TAC among the fishermen. Effective implementation of ITQs requires probably more monitoring effort than maintenance of the total landings within a given TAC, because catches of individual vessels must be followed in detail. In both cases there is need for detailed control. In more complex fisheries, where different fleet segments exploit a larger number of target stocks, achieving appropriate consistency through ITQs may be a greater problem than in the case of the North Sea beam trawling for flatfish.

ITQs do not resolve the problem of overcapacity. They must be supplemented by a system of licensing in order to keep the physical size of the total fleet under control. Neither do they ease the pressure from the industry on the administration to raise the level of the TACs.

Transparency does seem to be a major advantage of an ITQ system. Every ITQ owner knows from the beginning of the year how much of a specific species he is allowed to land.

Introduction of ITQs creates some new problems:

- There is need for rules regarding the trade in the ITQs and the administration must follow this

- trade closely in order to make the system effective.
- In order to maintain the stocks TACs must remain the guiding principle. Consequently, the administration cannot really fully guarantee that all ITQ holder will be in the position to exploit fully their allocation. A system of compensations may have to be instituted. This problem was resolved in the Netherlands by keeping an undivided 'national reserve', to cover some overfishing of ITQs.
 - If only some stocks would be managed by ITQs and other major target by a different system, there is a danger of shift of the fishing effort from the former to the latter.
 - It is likely that the ITQs will gradually concentrate in fewer hands. Some communities may lose a major industry. For new entrants it becomes very costly to enter into the fishery. The high capital value of the fishing companies may lead to some problems at the time of transfer from one generation to the next.

4.3 Theory and practice

There are at least three (but probably many more) unjustified major theoretical assumptions at the foundations of the optimism regarding the effectiveness of ITQs.

Biology

It is assumed that stock assessment can provide precise indications regarding the TACs. Such an indication is required in order to have 'something' to divide into the ITQs. However, marine biologists know fairly precisely what the actual size of a specific stock in a certain year was only many years later, when sufficient data for VPA is available. Indications of absolute volumes of stocks and consequently of the TAC can be given only with a large margin of error. Current 'state of the art' in stock assessment can in fact only indicate with reasonable reliability what the long term consequences will be of a specific change in fishing mortality (F). Also a desirable reduction of F can be indicated. This is the current type of advice given by ACFM / ICES to the European Commission.

This means that the figure with which marine biologists have learned to juggle is a 'relative change of a percentage', F being a percentage of the stock taken (on log scale). It will be self evident that the industry needs to know how much fish in tonnes they can dispose of. From the economic point of view 'relative change of a percentage' just is not good enough.

Fishermen can easier accept fluctuations of the nature, rather than fluctuations of 'bureaucratic decisions', although they may have the same result. What is required is an ITQ expressed as 'partial mortality', i.e. share in F. This ITQ would have to be translated into fishing effort or another commercially operational indicator.

Institutions

It is assumed that there will be institutional support to implement measures taken, be it ITQ or anything else. This is less self-evident than it seems. In fact many governments are rather reluctant to implement unpopular decisions, unless they really must. The institutional development in the Netherlands illustrates this point. Other examples are easy to find: the ambiguity about the division of responsibilities between the Council and the EC. Holden (1994) discusses this issue at great length.

When there is insufficient willingness to control fully the up-take of TACs, why should it be different when the TAC is divided among individual fishermen? It is rather naïve to expect that an entrepreneur will restrain himself just for the well-being of everyone else. Unless strict control is put in place fishing will continue as before. It is the same control which is required when only TACs are applied. The only difference is that now the government knows who should stop fishing and who can continue. And even in this case it is not so simple: the Dutch government could not stop vessels going to see if they intended to fish on 'non-quota species'.

Effective implementation of ITQs is institutionally much more demanding than a stop-go policy of TACs. Up-take level has to be monitored and administered for all individual vessels. Vessels which have exploited their ITQs have to be stopped, which may be a time and effort consuming process where various institutions are involved: controlling agency (e.g. Min. of Agriculture), prosecutors (Min. of Justice), independent judges and the penal system. It is essential to stress that in the prosecution process, fishing infractions are in the end compared to many other types of offences. This comparison determines a feasible level of fine (or punishment). It is not at all certain that this level will be prohibitively high to act as an effective deterrent against future offences.

In general there is a very serious lack of empirical research into the institutional aspects of fisheries management. Possibly this is the reason why the above myth has survived for such a long

time.

Economics

It is assumed that fishermen are profit maximizers. This is one of the basic assumptions in the common neo-classical theory, in which the consumers are 'utility maximizers'. Many (if not most) fisheries economists have relied heavily on the neo-classical theory, despite its well known drawbacks. Although this theory may be applicable to generalize the behaviour of the firm, in case of Dutch or EU fisheries we are not dealing with 'firms' but with people, who have also other desires than 'profit'. One of those desires is to stay in business, keep on fishing and maintain a way of life. This has major consequences for the behaviour (or economic rationality) of these people. They will accept low income for quite some time. They will not quit fishery because it is economically rational, but only when they are forced to do so (by their bank). Consequently, overcapacity is maintained for a long time despite the apparent waste of capital.¹²

Fishermen could be considered utility maximizers in certain sense. But than the well known picture of MSY and MEY may look quite differently. While quantifying monetary costs, revenues and profit is rather simple, to quantify these aspects in terms of utility units, including various qualitative components, will be rather tricky.

Some economists favour ITQs because they expect a 'homo economicus', who will adjust his behaviour to maximize his profit. This implies he will buy or sell ITQs, adjust his investment, carry out fishing according to a plan, etc. Economic rationality occurs in certain respects only when ITQs are enforced well.

Even if fishermen were profit maximizers in the neo-classical sense, there is no reason why ITQs should constrain the intensity of competition within the sector. Why should there be solidarity all of a sudden? Competition is the essence of market economy, which leads to an ever increasing 'efficiency'. There will be always a drive to invest in new technology to survive in the jungle of competition with fellow fishermen and consequently there will be a continuous tendency to overcapitalize, leading to pressure on government to increase TACs or possibly to illegal fishing.

5. CONCLUSIONS

1. ITQs are production rights. They resolve the problem of distribution of production opportunities. They are only indirectly linked to conservation of stocks, namely through the total allowable catch on the basis of which they have been determined.
2. Dutch experience with ITQs shows that they can be effective if they are applied consistently with other measures (e.g. licensing) and if there is clear commitment to their effective implementation.
3. Optimism about effectiveness of ITQs is based on three false theoretical assumptions in the field of biology, institutions and economics. In reality:
 - stock assessment cannot provide reliable and precise indications of TACs for next year, not to speak of several years ahead;
 - it is not certain to which extent the current institutions are capable and/or willing to implement ITQs (or any other fisheries management measure) effectively;
 - fishermen are people, not firms, their behaviour is not based on profit maximization, but on complex assessment of economic as well as socio-cultural aspects. ITQs will not change them into 'homo economicus'.
4. Overcapacity is partly a result of competition within the industry. ITQs will not lead to solidarity.

¹²This may be one of major differences between the Netherlands and other countries where ITQs have been implemented. Processing companies have shown until now little interest to acquire ITQs, so that while concentration has taken place, a family company remains the characteristic for the industry.

5. CFP pursues four objectives: stock conservation, economic viability of the fishing sector, availability of fish for the consumers and protection of the environment. Establishment and proper enforcement of ITQs will:

- contribute to stock conservation only if the level of TACs is properly set;
- strengthen the long term economic viability of the firms which manage to survive (happy few), but many firms will have to leave; ITQs cannot guarantee maintenance of regional fishing interests or jobs;
- possibly increase the production costs of fish, which will have to be paid for by the consumers;
- not have clear impact on environment.

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Appendix 1. Criteria for evaluation of fishery management measures

<i>Economics</i>	<i>Level of individual enterprises</i>
FLEXIBILITY	short term decisions - where, when and what to fish
PLANNING	long term decisions - investment
MARKET CONSISTENCY	(dis)incentives - policy in line with market forces
DAILY PRACTICE	frictions between what is administratively desirable and what the natural environment makes possible
RACE FOR FISH	irregularities of production process
ECONOMIC PERFORMANCE	change in profitability due to volume of landings
<i>Biology</i>	<i>Natural environment</i>
SPAWNING STOCK	minimum level
FISHING MORTALITY	stabilization at desired level
UPGRADING	discards of commercial species
DISCARDING	non-commercial species
ECOSYSTEM MANAGEMENT	prevention irreversible processes - precautionary principle
<i>Policy/institutions</i>	<i>Private (sectorial) and public interests at aggregate level</i>
POLITICAL ACCEPTANCE	will/commitment to implement
SECTORIAL ACCEPTANCE	credibility, scientific objectives vs. measures taken
RELATIVE STABILITY	fixed allocation of TACs
NATIONAL ENFORCEMENT	feasibility of effective implementation and control, given available funds
SUBSIDIARITY	delegation of the implementation to local/regional institutions
LOCAL COMMUNITIES	socio-economic impact
BEYOND 2002	principles of EU - free movement
<i>Other considerations</i>	
CONSISTENCY	economic, biological and political consequences
TRANSPARENCY	clear justification and explanation
NEW PROBLEMS	

Source: Salz et.al. (1996)

Appendix 2. Historical overview of the Dutch fisheries management measures

- 1975 - Investment stimulation scheme is introduced, incl. sea going vessels. It offers a fiscal rebate of 12% on new construction.
- 1975 - NEAFC sets TACs and national quota for six species, incl. plaice and sole
- 1976 - The Netherlands introduce an ITQ system based on historical track record. ITQs are specified as percentage share in national quatum. On the basis of the quatum and the share, fishermen are allocated annually a specific amount of a species in kilograms.
- 1977 - ITQ system is revised to take into account heavy investments undertaken in that period. ITQ is based on engine horse power (50%) and historical catches (50%).
- 1977-84 - ITQs are barely implemented. They are just a 'piece of paper'.
- 1981 - First codfish entitlements introduced ('k-document'). They are not transferable.
- 1984-85 - Licensing system is introduced based on the engine power of the vessels. The ceiling set on the total engine power of the fleet is made partly ineffective because of large investments made just prior to the introduction of the licenses. All vessels 'under construction' must also be given a license. Licenses are freely tradeable and divisible. Free license, not attached to any active fishing vessel remains valid for 2 years.
- 1985 - Transferability of ITQs is officially allowed, after substantial informal trade during the previous years.
- 1987 - National reserve is created: part of the national quota is not divided among ITQ holders, but kept in reserve by the administration in order to cover individual overfishing of ITQs and allow others to fully utilize their rights. Reserve is about 5% of the national quota.
- 1987 - Uniform prosecution of fishery offences is promoted by creation of regular consultations among the responsible attorneys general.
- 1987 - Fiscal subsidy on investment is closed
- 1987 - Maximum engine power of new to be built vessels is set at 2000 hp. Prior, vessels of up to 4500 hp were built. Maximum beam length is set at 12m.
- 1987-92 - System of obligatory days in port.
- 1987-89 - Legal framework is gradually being developed. Responsibilities between the various ministries are not effectively divided.
- 1988 - Second codfish entitlement introduced (annual and seasonal, 'j-' and 's-document'), non-transferable.
- 1988 - Strict monitoring of landings is introduced with 120 controllers on 600 vessels. Strict rules are set regarding places, times and conditions for unloading fish.
- 1988 - Several violent encounters between fishermen, controllers and riot police.
- 1988-89 - First decommissioning scheme (MAGP II). Industry contributes approximately 10% of the total costs.
- 1988-90 - Creation of first quota management groups. These groups failed because of insufficient control and their weak legal position.
- 1989-90 - Administration cracks down on auctions which allow trade in illegal landings. Several individuals are jailed for questioning. Severe fines are imposed (un)conditionally.
- 1990 - Fisheries minister has to resign because of inadequate measures to contain infractions on overfishing of quota.
- 1990 - Overfishing of ITQs is 'punished' by cutting the ITQ of the following year by the nominal amount of overfishing. In this way the government did not have to compensate vessels which were not able to fully utilise their ITQ because of early closure of the fishery.
- 1990 - Trading in quota is only allowed as long as the vessel has not taken up more than 90% of his ITQ.
- 1990-92 - Legal prosecution of offences becomes more effective. Fishermen give up their previous continuous challenge of legal validity of new regulations after the administration consistently begins to win cases in court.
- 1992 - Days in port are changed to 'days-at-sea', based on ITQs.
- 1993 - Upon transfer of licence which is not attached to an active vessel, its nominal value is reduced by 10%.
- 1992-93 - Second decommissioning scheme (MAGP III)
- 1993 - Validity of 'free licenses' restricted to 6 months (from previous 24 months).
- 1993 - Co-management groups are created, with a mandate to facilitate trade in ITQs (and effort allocations) on behalf of their members. Groups are not (yet) ITQ owners. About 95% of

the fleet joins. Groups offer greater facility of trade in ITQs. There is a threat of obligatory decommissioning.

- 1993 - Sale of landings through auctions becomes obligatory to allow controls. (Council Reg. 1847/93, par.9 requires sales slips to support logbook declarations.)
- 1993-96 - Existing system is maintained. Stress is put on cooperation between the government and sector organizations.
- 1994 - Codfish documents become ITQs for cod and whiting.
- 1996 - Third decommissioning programme (MAGP III)
- 1996 - ITQs for herring and mackerel are introduced

Appendix 3. Elaboration of the 'Days-at-sea' formula

$$\text{Days}_t = \left\{ \left[(\text{ITQ}_t / \text{Quota}_t) * (\text{Price}_{\text{ref}} * \text{Quota}_{\text{ref}}) * A_t \right]^{\text{sole}} + \left[(\text{ITQ}_t / \text{Quota}_t) * (\text{Price}_{\text{ref}} * \text{Quota}_{\text{ref}}) * A_t \right]^{\text{plaice}} \right\} / f_{\text{ref}}$$

Quota	=	National quota, which follows from TAC and possible swap with other Member States (dimension: kilograms)
ITQ	=	quantity in kg of the species in the current year (dimension: kilograms)
A	=	Abundance factor, corrects for change in catchability in relation to change in quota (dimension: none)
f	=	average revenues per fishing day of a vessel with the given engine power (based on a statistical relation) (dimension: NLG/day-at-sea)
ref	=	average value for the 3-year reference period t-2 to t-4
t	=	current year

(1) $(\text{ITQ}_t / \text{Quota}_t)$	indicating the current share of the vessel in the national quorum, i.e. taking into account ITQ sold or acquired during the previous year (dimension: %)
(2) $(\text{Price}_{\text{ref}} * \text{Quota}_{\text{ref}})$	total value of the quorum in the reference period (dimension: NLG)
(3) $(\text{ITQ}_t / \text{Quota}_t) * (\text{Price}_{\text{ref}} * \text{Quota}_{\text{ref}})$	value which could have been realized in the reference period with the current share in quorum (dimension: NLG)
(4) $(\text{ITQ}_t / \text{Quota}_t) * (\text{Price}_{\text{ref}} * \text{Quota}_{\text{ref}}) / f_{\text{ref}}$	number of days required to realize the hypothetical value, which could be obtained from that species (dimension: days)

Abundance factor - A

In the term (4) it is assumed that the partial fishing mortality is constant, i.e. per unit of fishing effort (in hp-days) same share of stock is taken (in %). In other words the cpue (kg/hp-day) decreases proportionately with the stock and the quorum. Relative change of the stock and the quorum have to be identical. Evidently this is seldom the case. Particularly when the stock is close to (or below) MBAL, substantial decrease of quorum may be imposed while the relative change of the stock may not be very important. In that case the cpue may not change significantly while only a limited total effort will be sufficient to exhaust the quorum. For this reason the abundance factor A has been introduced.

An appropriate methodology to quantify the value of A still has to be developed. In 1996 this value has been set by the Min. of Agriculture on the basis of an expert assessment.

Price and volume component

If $A=1$, the assumption of proportionate change in cpue (in relation quorum) leads to a constant number of fishing days required to exploit the quorum. Higher or lower quorum will not lead to a change in the allowed effort. This assumes that the quota have been historically set at the appropriate level of fishing mortality and that the exerted fishing effort achieved a 100% up-take. An adjustment in the value of A can then account for 'irregularities' in these variables.

Development of prices in year t is of no effect on the resulting allowed effort. It only leads to a higher revenue realized with the given quorum. The formula utilises only the prices of the reference period, i.e. constant prices, so that the result is a good proxy for physical values of quorum (in kg).

Technological progress

Technological progress will increase the value of the term f_{ref} (revenues/day) and depress the number of days at sea allowed, in comparison with previous years. The slope of the term $\left[(\text{Price}_{\text{ref}} * \text{Quota}_{\text{ref}})^{\text{sole}} + (\text{Price}_{\text{ref}} * \text{Quota}_{\text{ref}})^{\text{plaice}} \right] / f_{\text{ref}}$ can be considered as a proxy for average technological progress.

The technological progress of an individual vessel is not included. This seems rather complicated as experience of skipper and crew would have to be accounted for as well, i.e. not only new electronics or engine, but also a new skipper would have to be included in the calculation. Overall development of skill is implicitly included in the f.