Maori Participation in Fishing:

Economics of Opportunity

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1. Introduction

In the early 1980s New Zealand’s fisheries were in bad shape, valuable inshore stocks were fragile and economic performance was low. In 1986 New Zealand implemented a fundamental reform that launched the seafood sector onto a trajectory of economic growth based on sustainable harvest. By international standards the economic gains associated with rights-based fishing have been truly remarkable (Sharp and Batstone, 2007).

Twenty years ago the High Court restrained the Minister of Fisheries from further implementing the quota management system (QMS) because of claims being considered by the Waitangi Tribunal. Rights-based fishing gave added impetus to a need to reverse the process that had marginalised Maori enterprise in the fishing economy (Sharp and Bromley, 1991). After considerable opposition to the Maori Fisheries Bill 1988, a re-drafted version was passed in 1989 which gave specific recognition of Maori fishing rights and initiated a process of enabling Maori to participate in fishing industry. This interim settlement package included tradable quota rights and cash which were to be managed on behalf of Maori. In 1992 the Treaty of Waitangi (Fisheries Claims) Settlement Act provided $150 m which was used to buy a half share of Sealord and a guarantee of further quota. The Treaty of Waitangi Fisheries Commission was formed in 1992 and it, along with its successor Te Ohui Kai Moana (TOKM), was given the task of developing a method for sharing fishing assets among all iwi. Thus began a process that lasted 12 years culminating in the Maori Fisheries Act 2004.

The Maori Fisheries Act 2004 aims to provide for the development of the “collective and individual” interests of iwi in fisheries that is for the “benefit of all Maori”. Although the Act provides a framework for the allocation and management of settlement assets it should be emphasised that Maori entities exercising their rights under the Maori Fisheries Act 2004 do so within the governance structure provided by the Fisheries Act 1996. Thus Maori have rights and obligations that derive from two statutory sources, not one. First, settlement quota enables Maori to exercise a right to harvest defined species of fish within given fisheries management areas. The rights embodied in settlement quota derive from and are subject to the rules the Maori Fisheries Act. Second, settlement quota rights are exercised within and governed by
the Fisheries Act 1996. Thus adjustments to the total allowable catch (TAC), the total allowable commercial catch (TACC) arising from issues related to sustainability and, possibly, reallocations across competing interests in “shared fisheries” have direct economic implications for Maori right holders. Maori fishers face the same regulatory, monitoring, and user pay regimes as other commercial fishers. This paper focuses on Maori participation in commercial fishing and does not wander into issues related to reallocation and user pay regimes.

In his key note address “Developing Assets” at Hui Taumata 2005 Rob McLeod described the relevance of general economic models to Maori assets; identified the key elements of economic frameworks that apply to Maori assets; and, discussed specific Maori issues. The aim of this paper is to build further on the ideas presented by Rob McLeod. However, before doing so I want to emphasise three important points made in his address. First, the ingredients to economic success are not unique to Maori; ex ante no one knows what the winning formula is – success comes from innovation. Second, assets are capital and the value of capital is the flow of income it yields - settlement quota is a capital asset. Third, organisations – commercial for-profit firms, non-profit firms, partnerships, joint-ventures, and so on – perform key roles in the economy. To varying degrees organisational arrangements, as objects of choice, contribute to the growth of capital and the flow of income from that capital. Rob McLeod provides a convincing case for the corporate model and I see no additional benefit in traversing this topic again.

While building on the above themes, this paper will emphasise the significance of initial entitlements, the rights that attach to settlement quota, and the rules of governance that surround Maori commercial entities. These too underpin the wealth creating opportunities for Maori. The first section reviews the structure of governance imposed by statute. An analysis of property rights embedded in settlement quota is presented next. The third section provides an analysis and discussion of the range of organisational arrangements available to Maori for participating in the seafood sector. The paper concludes with a summary of findings.
2. **Organisational Structure**

The Maori Fisheries Act 2004 performs two essential economic functions. First, it provides a governance framework for Maori participation in the seafood industry. Second, it establishes initial quota entitlements, provides for the transfer of initial entitlements to mandated iwi organisations (MIOs), and defines the property rights in settlement quota. In principle an iwi fishing organisation is able to exercise rights like other commercial entities within the context of the QMS. However, there are important differences in governance and the structure of property rights that distinguish a commercially focussed Maori fishing organisation from other commercial entities. The aim of this section is to highlight these differences.

![Diagram of governance structure]

**Figure 1: Structure of governance**

**Supra Governance**

The purpose of Te Ohu Kai Moana (TOKM) is to advance the interests of iwi primarily in the development of fisheries, fishing and fisheries related activities. Te Ohu Kai Moana Trustee Ltd (TOKMT), the sole company of TOKM, administers the allocation and transfer of settlements assets, appoints directors to Aotearoa Fisheries Ltd (AFL) and can *inter alia* promote research into sustainable fisheries management,
monitor progress of MIOs, acquire or dispose of income shares and settlement quota, and sell the annual catch entitlement (ACE) generated by settlement quota or other quota holdings. TOKMT must transfer all of its assets to AFL\(^1\).

If settlement quota is not transferred to a MIO then TOKMT must offer ACE to MIOs in a manner that reflects as closely as possible the allocation outlined below. If TOKMT considers the recognised iwi organisation has not made progress towards meeting the criteria for becoming a MIO, or there is no MIO, or recognised iwi organisation, or if there is no agreement on how to divide the ACE, then TOKMT can either offer ACE to AFL or the open market. TOKMT must retain at least 20% of the income shares and, until they are allocated, hold the remaining 80% in trust for iwi.

The Minister of Maori Affairs appointed the first directors of TOKMT; subsequent changes in directors are made by Te Kawai Taumata, a group of elected Maori representatives. Settlement asset money was transferred to Te Putea Whakatupu Trust ($25 m) which holds and manages funds on behalf of beneficiaries of the Deed of Settlement (1992) for the purpose of education and development of skills relevant to the advancement of Maori in the fishing industry; and to Te Wai Maori Trust ($12m) which is constituted in a similar manner to advance Maori in respect of freshwater fishing interests.

**Mandated Iwi Organisation**

Once TOKMT is satisfied that an iwi meets governance criteria\(^2\) it becomes recognised as a MIO. A MIO must have at least one asset holding company. The asset holding company receives, and holds on behalf of its iwi, settlement assets and grants from TOKMT. Settlement assets become part of the subscribed capital of the company. The MIO’s asset holding company (possibly more than one) receives and holds on behalf of the iwi all settlement quota and income shares allocated by TOKM, provides dividends to the MIO but is not permitted undertake fishing or hold a fishing permit. A MIO can enter into agreements with other MIO to establish companies to undertake fishing and fishing related activities including. A recognised MIO has the right to

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\(^1\) There are exceptions, such as TOKMT interests in ACE Trader Ltd, Whangapae Mussels Ltd and Southern Abalone Ltd.

\(^2\) Criteria include establishing a legal entity such as a company, trust or incorporated society, appointment of directors and an asset holding company.
participate in the process of offering ACE but it does not have the right to receive quota, purchase settlement quota, receive or purchase income shares, enter into agreements with other iwi. A MIO can only sell (including exchange) its AFL income shares to: TOKMT or to another MIO subject to 75% approval by adult members of the iwi. Iwi members are to be provided with an estimate of the net present value or likely sale price of the shares.

**Aotearoa Fisheries Ltd**

The Maori Fisheries Act 1989 refers to Aotearoa Fisheries Ltd (AFL); the 2004 Act required the Treaty of Waitangi Fisheries Commission to form a new company with the same name. Although the company was established to maximise the value of Maori fisheries assets for the benefit of its iwi and Maori shareholders it must also work co-operatively with iwi on commercial matters. AFL has substantial assets; for example, it owns Moana Pacific Ltd and has a 50% shareholding in Sealord and Prepared Foods Ltd. It is a significant player in the New Zealand seafood industry. Directors are appointed by TOKMT who control all voting and initial income shares of AFL.

All of AFL’s 125,000 income shares were issued to TOKMT. These shares can only be owned by TOKMT and MIOs through their asset holding companies. TOKMT must retain ownership of 20% of the income shares issued at any time by AFL who can issue additional income shares. Income shares owned by MIOs can be sold to TOKMT and other MIOs. All MIOs will hold income shares in AFL and receive annual dividends. AFL is required to pay not less than 40% of the group’s net profit after tax to its income shareholders. TOKMT is required to allocate income shares in AFL to iwi.

3. **Property Rights**

In 1986 New Zealand implemented a rights-based system of commercial fisheries management. The structure, operation, and evolution of the quota management system (QMS) has been described in detail elsewhere (Sharp, 2005) and need not be repeated here. It is sufficient to say that Maori commercial fishing organisations will operate within a regulatory environment that is common to both Maori and non-Maori
commercial entities alike. For example, adjustments to the TAC and TACC apply equally as do rules governing by-catch, gear restrictions, and so on.

As noted above the Maori Fisheries Act 2004 provides the legislative framework for settlement quota and the transfer of settlement quota to iwi. At the level of iwi organisation, initial entitlements provided by legislation combine with settlement quota to determine the opportunities available for profit making and wealth creation. This section will describe and analyse the property rights in settlement quota from an economic perspective.

3.1 Initial Entitlements

Initial entitlement is a term used to describe the initial distribution of rights. Endowments are important because they determine, along with other factors, opportunity within the economy. To illustrate, iwi A receiving 1 tonne of paua settlement quota has less opportunity than iwi B receiving 3 tonnes of paua and 5 tonnes of rock lobster settlement quota. The commercial opportunity for Iwi A to add value to its endowment would be limited to leasing ACE, possibly joint-venturing with another commercial entity. In contrast, the endowment of iwi B might be sufficient for it to consider adding value by leasing ACE, joint-venturing, or going it alone and developing its own commercial fishing enterprise.

Initial entitlements matter. So too do transaction costs. Transaction costs are the costs of doing business and are usually associated with gathering information, negotiation, monitoring and enforcing agreements. Given an initial endowment, transaction costs will work to limit the iwi’s ability to maximise the value of its settlement quota. For example, the “75% voting rule” is a cost of doing business that is borne by iwi but not non-iwi fishing firms. Stitching together contracts with other iwi in order to benefit from economies of scale will involve transaction costs. The range of contracting possibilities is too broad to capture at a general level. However, it is most likely that the opportunity for an iwi to add value to its initial entitlement of settlement quota will be negatively correlated with transaction costs. That is, high transaction costs work to limit commercial opportunity. Rules governing the transfer of settlement quota as outlined below give rise to transaction costs over and above what might exist in the commercial sector. It is important therefore that iwi organisations design their
business ventures so as to economise on transaction costs within the constraints imposed by legislation.

Griffen (1991) has shown that transaction costs convey inertia to initial entitlements. The difference between pre-trade and post-trade allocations decreases with increasing transaction costs. For example, consider the sale of settlement quota (SQ) relative to regular quota (RQ) and assume that the transaction costs of sale (denoted $c$) are such that $c(SQ) > c(RQ)$. This seems reasonable because a proposal to sell SQ must pass the “75% rule” and transfer is typically constrained to other MIOs. Transaction costs will work to lower the relative value of trade to the MIO and thus reduce the movement of quota among MIOs relative to the movement of RQ within the industry. Transaction costs also impact market liquidity, a term used to describe the ability to quickly buy or sell a right. The essential feature of a liquid rights market is that there are numerous buyers and sellers. Relatively low transaction costs, inter alia, is a feature of a liquid asset. The frequency with which rights are bought and sold provides an empirical measure of liquidity. Thus transaction costs can affect both post-trade allocations and the liquidity of the rights market.

**Inshore quota**

Any harbour quota is set aside and TOKMT then allocates to each iwi a portion $q_{m,i}$ of the quota management stock as follows:

$$q_{m,i} = \frac{c_{m,i}}{\sum_{m} c_{m}} Q_{i,k}$$

Where

$c_{m} =$ length of coastline within iwi $m$

$c_{m,i} =$ iwi $m$’s coastline within quota management area $i$

$Q_{i,k} =$ number of quota shares in inshore stock $i$, area $k$, net of harbour quota ($\hat{Q}_{i,k}$).

**Deepwater quota**

For deepwater quota, TOKMT splits settlement quota as follows: (1) 25% of the parcel is allocated as above; and (2) 75% is allocated by percentage of population.
\[ q_{m,d} = \frac{1}{4} \sum_{m} c_m Q_{d,k} + \frac{3}{4} \sum_{m} p_m Q_{d,k} \]

Where

\( p_m = iwi \, m's \, percentage \, of \, the \, total \, population. \)

\( Q_{d,k} = \text{quantity of deep water quota in area} \, k. \)

**Harbour quota**

Harbour quota is deducted from the total settlement quota before allocation and then allocated based on coastline claims for that harbour quota.

\[ q_{m,h} = \frac{c_{m,h}}{\sum_{h} c_h} \hat{Q}_{l,k} \]

Where

\( c_{m,h} = iwi \, m's \, proportion \, of \, the \, harbour \, h \, coastline \, claim \)

\( \hat{Q}_{l,k} = \text{harbour settlement quota set aside, stock} \, i, \, \text{area} \, k. \)

For simplicity harbour settlement quota has been combined with inshore quota; thus the quota assets held by a MIO (through its asset holding company/companies) comprise inshore quota and deepwater quota.

\[ q_m = \sum_i q_i + \sum_d q_d \]

**Income shares**

The income shares in AFL must be allocated by TOKMT in the percentage specified in Schedule 3 of the 2004 Act. This schedule lays out each iwi’s percentage of the total iwi population. The range of iwi percentages is considerable, ranging from a minimum of 0.073% to a maximum of 15.791%; the mean is 1.78%. The Lorenz curve shown in Figure 2 provides another way of looking at the distribution of income shares. The percentage of iwi is plotted on the horizontal axis and the percentage of income shares is plotted on the vertical axis. Figure 2 shows that the bottom 60% of iwi have less than 10% of the total income shares. The straight line in Figure 2 depicts the line of perfect equality – that is the bottom Y% of iwi have Y% of the income shares. The Gini coefficient, which ranges between 0 (perfect equality) and 1 (perfect
inequality), is another measure of inequality. The Gini coefficient for income shares is 0.66 indicating a degree of inequality. While these results are to be expected – because the allocation of income shares is percentage of population based – they do highlight the distribution of assets across iwi. A similar type of analysis could be done once the transfer of quota to iwi has been completed. The results do however point to a large degree of asset variability among iwi once the allocation is complete. The implication of this observation is that the challenge using settlement assets will vary across iwi and particular care should be taken to designing organisational structures that offer a high chance of achieving optimal outcomes.

![Lorenz curve of population based income shares](image)

Figure 2: Lorenz curve of population based income shares

3.2 **Property Rights in Settlement Quota**

**Quality of Title**
Quota shares allocated under the Deed of Settlement are registered with MFish as settlement quota under the Fisheries Act 1996. Mortgage interests can be registered under the Act however if the settlement quota is transferred to the mortgagee then the tag is not extinguished.

**Transfer**
Applications to transfer must be submitted to MFish and TOKM. Importantly, under S 161 a MIO must not sell its settlement quota except to another MIO or an entity within the TOKM group. A MIO cannot sell any settlement quota earlier than 2 years.
after the data of transfer from TOKM. A proposal to sell settlement quota must be notified to adult members of the iwi and obtain approval of not less than 75% of adult members of the iwi who vote. Prior to sale iwi must be informed on the likely market value of settlement quota.

Settlement quota cannot be transferred unless authorised by TOKMT. A MIO can request any quota owned to be registered as Settlement Quota, thus regular quota can be “converted” into settlement quota provided the “voting rule” is satisfied\(^3\). A MIO can, provided the “75% rule” is satisfied, request TOKMT approval to exchange small parcels of settlement for non-settlement quota. Small quota is usually defined as having market value less than $100 (S172) or a greater amount specified by TOKMT (S176)\(^4\). A transfer of “small parcels” in this manner effectively removes the “settlement quota” tag on the share.

A MIO can only transfer its settlement quota to another MIO (only after 2 years) or entity within the TOKMT group provided the “voting rule” is satisfied. The competitive bidding process outlined in the Act is essentially an English 1\(^{st}\) price auction. Settlement quota can be used in exchanges with parties other than the TOKMT Group and MIOs provided TOKMT approves the exchange and is satisfied that the exchange is of equivalent market value. After the exchange, the settlement interest remains registered against the share quota\(^5\). Furthermore, the settlement tag is registered against any non-settlement quota received.

### 3.3 Analysis of Property Rights

We now map the above dimensions of a property right into value (Arnason, 2000). The quantitative measure used to illustrate quality along each axis and ranges from 0 to 1. For example, if the right is defined in perpetuity then it receives a score of 1. If the right was not tradable then it would receive a score of 0. Figure 3 illustrates how the above dimensions of property rights map into value. In terms of duration, both types of quota score the same. On the surface it would appear that settlement quota

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\(^3\) The “voting rule” refers to a legal requirement that 75% of adult members of the iwi must approve of a proposal.

\(^4\) Refer S 172 and S 176 of the Maori Fisheries Act 2004.

\(^5\) S160 states that the settlement quota interest remains in force if the settlement quota is transferred unless the settlement quota interest is removed.
score more highly in terms of security and exclusivity because of the legislative force embodied in the Maori Fisheries Act. Owners of regular quota might have to gain legal recognition of security and exclusivity through the courts. However, settlement quota is not as readily transferable and scores lower than regular quota. Although the mapping is indicative Figure 3 it would appear that regular quota would score higher overall and the higher score would be reflected in the value \( v^{RQ} > v^{SQ} \).

Table 1: Comparison of property rights

<table>
<thead>
<tr>
<th>Settlement Quota</th>
<th>Non-settlement quota</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tagged as settlement quota</td>
<td>Not tagged</td>
</tr>
<tr>
<td>Generates ACE</td>
<td>Generates ACE</td>
</tr>
<tr>
<td>Constraints on sale:</td>
<td>Constraints on sale:</td>
</tr>
<tr>
<td>Sell to another MIO*</td>
<td>Minimal other than foreign ownership</td>
</tr>
<tr>
<td>Sell to TOKM*</td>
<td></td>
</tr>
<tr>
<td>Settlement quota can be leased for up to 5 years*</td>
<td>No limits</td>
</tr>
<tr>
<td>Offer as security*</td>
<td>Free of offer as security</td>
</tr>
<tr>
<td>After holding for 2 years settlement quota can be swapped through TKM*</td>
<td>No constraints</td>
</tr>
</tbody>
</table>

Note: * indicates that inter alia the 75% approval rule must be satisfied.
4. Economics of Participation in Fishing

From the above description of the distribution of settlement quota it is clear that the opportunities for participation in the seafood industry will vary across iwi entities. A small number of entities either own a vessel or have an agreement with a vessel owner and possibly upstream processors too. Many will not have access to harvesting capacity. Combining this observation with likely variations in settlement portfolios, access to capital, skills, and so on, suggests that participation should be crafted to suit individual iwi. As Rob McLeod has stated, one model will not suit all. In order to impose some structure on the discussion ahead I do assume that an iwi receiving settlement assets wants to enhance the value of its settlement quota.

Participation will come in many forms. The following possibilities are discussed.

- **An existing going concern**: for example an iwi entity with a vessel(s), holding regular quota and receiving settlement quota\(^6\).
- **A new entrant**: the newly formed iwi entity that has sufficient quota (regular and settlement quota) and capital to invest in a vessel(s).

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\(^6\) For example, Waikato established Raukura Waikato Fisheries Ltd in 1997 by acquiring 3 trawlers, 2 retail outlets and 400 t of quota (Findlay, 2006).
• **ACE trader**: sells ACE spawned by its settlement quota on the open market. The ACE trader can contract annually and/or enter into relational contracts that span a period of time\(^7\).

• **Joint venture**: combine settlement quota with other owners of assets, possibly but not necessarily, other iwi\(^8\).
  - **Horizontal joint venture**: join-up with other iwi entities to sell ACE on the open market; join-up with other iwi entities and actively participate in fishing.
  - **Vertical joint venture**: join-up with another (not necessarily iwi) entity that is actively fishing.

### 4.1 Asset Specific Investment

An asset specific investment is one for which the economic return on the next best alternative use of the asset is very low or zero. Hydroelectric dams, gas extraction platforms, geothermal power plants, and gas pipe lines are asset specific investments. They are idiosyncratic, purpose built and supply services to upstream buyers. Settlement quota has an element of asset specificity because its value derives from the right to harvest fish. The tag that attaches to settlement quota combined with the rules governing its removal increase its specificity relative to regular quota. The right to harvest 1 tonne of snapper from area 1 is exactly that, nothing else. Unlike the right to land, which can be used for many purposes (subject of course to planning constraints), settlement quota confers no other use right. Of course, the right can be leased out, mortgaged, and the ACE traded but the use right is specific.

Asset specificity in intermediate markets exposes owners to opportunistic behaviour. For example, if iwi A contracts with a buyer of ACE this year and next year that same buyer discovers that iwi B will offer its ACE at a lower price then the value that iwi A can extract from the market will be lowered, not zero possibly but lowered. Of course, some would say that this is the ACE market working but the significance of this type of behaviour is that any rents attached to settlement quota are transferred from the seller to the upstream buyers. If buyers have power in the market then they could

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\(^7\) For example, Te Runanga o Ngatiwhatua on-leases quota via a strong relationship with Leigh Fisheries, a private company (Findlay, 2006).

\(^8\) For example, Ngai Tahu Seafoods and Raukura Moana Fisheries Ltd have formalised a deal that involves ACE swaps, to the benefit of both parties.
extract surplus that would otherwise accrue to iwi sellers. Forming a joint venture with other iwi might reduce opportunistic behaviour.

4.2 Asset valuation

Settlement quota is an asset that provides a flow of annual rights (ACE). These rights combine with other factors – capital tied up in vessels, labour and so on – to harvest fish. Although the cost of a vessel might run into the millions, its economic value is the present value of returns over its working life. Or looked at another way, it is the present value of a right to the services provided by the capital asset. Dimensions of the property right that impact the value of settlement quota are outlined above, more detail can be found in Sharp (2007).

The value of settlement quota is, by definition, the present value of the right to harvest fish. When the right is exercised – either through sale on the ACE market or used in a harvesting operation – a flow of net revenue (revenue less costs) is returned to the asset holder. In the instance, the flow is on an annual basis; in the latter, the flow would occur over a period of years. To generalise, the flow is assumed to occur over $T$ years (e.g. 10 years) thus the present value of this future flow is the value of the asset. More sophisticated approaches to asset valuation are available, but this exposition is sufficient. Thus, keeping it simple, quota value is given by

$$v(q) = \sum_{t=1}^{T} \frac{z_t}{(1 + r)^t}$$

Where

$v(q)$ = value of settlement quota
$z_t$ = revenue less costs each year
$r$ = discount rate e.g. 10%
$t$ = year
$T$ = end of the planning horizon (say, 10 years)

Choosing a mode(s) of participation in the seafood industry will determine the future flow of net revenue $z_t$ and hence the value of settlement quota. In this respect the bogey facing iwi is: which mode of participation will make the greatest contribution
to enhancing the value of our settlement quota? An overview of possible modes of participation options is presented next.

### 4.3 Participation possibilities

The acquisition of settlement quota will unleash a dynamic that begins with iwi deciding on the vehicle for participation in commercial fishing. This process will occur within the legal framework common to all business in New Zealand and in accordance with the Maori Fisheries Act 2004. Naturally, each option should be explored within the context of each iwi. Each option will have both revenue and cost (including transaction costs) implications; I have reduced this to profit – the amount of money left after all factors of production (including management) have been paid their opportunity cost. The opportunity cost principle applies to organisational choice too; that is: what is being given up to get (i.e. profit) what we get?

Following Williamson (1979) we can identify uncertainty, frequency of exchange, and the degree to which investments are transaction specific, as dimensions common to the range of organisational possibilities discussed below. Established fishing entities have already asset specific investments *viz.* harvesting and quota; like many others they will face uncertainty over product price and adjustments to the TACC; but they are relatively free to exercise their quota rights during the fishing season. An iwi deciding to operate as an ACE trader will have an asset specific investment in the form of settlement quota; it will face uncertainty over ACE prices; but it has the freedom to sell its rights at any time during the fishing season. Writing a contract to cover the sale of ACE is a discrete market transaction. The ACE trader can, of course, enter into contractual arrangements with buyers that might span a number of years. Joint ventures represent an organisational structure that lies somewhere in between the two. The main point coming out of Williams’ (1979) schema is that transaction costs will vary across the continuum and will increase as one moves from simple exchange to more complex exchange governed by contract. Full integration, where an iwi buys out another fishing entity might economise on some transaction costs but give rise to other, within, organisational costs.
**Adjustments by established fishing entities**

An established iwi fishing firm can adjust both its asset base and annual output so as to maximise profit. For example, settlement quota could provide the basis for achieving the cost advantages of economies of scale (and scope). Thus an established iwi fishing venture might look over a longer time horizon and consider the levels of production it might produce. Figure 4 is used to illustrate the principle involved. Assume that the iwi firm has fishing assets (vessel and regular quota) before receiving settlement quota. Let:

\( \bar{q} \) = the existing ownership of regular quota,

\( \tilde{q} \) = is the firm’s endowment of settlement quota,

\( K \) = capital, in this instance a boat,

\( p \) = price of landed fish.

Assuming that \( \bar{q} \) limits expansion then the optimal level of capital is \( K_1 \), \( \bar{q} \) tonnes of fish are landed and profit is given by

\[
\pi_1 = (p - AC(\bar{q}))\bar{q}
\]

Let’s now assume that the iwi receives its endowment of settlement quota \( \tilde{q} \) which has a value of \( v(\tilde{q}) \). If the price of landed fish is \( p \) and the organisation can borrow up to 1/3 of the settlement quota value then the profit maximising decision is to invest in capital \( K_2 \) with associated average cost of production (\( AC_2 \)) and marginal cost of production (\( MC_2 \)). In this case the iwi leverages off the value of its settlement quota by offering it as security and invests in harvesting capacity \( K_2 = K_1 + I \) where

\[
I = \frac{1}{3}v(\tilde{q}).
\]

Figure 4 shows the entity maximising its profit over the long run investing up to the cost-minimising levels represented by \( MC_2 \) and \( AC_2 \). Profit is now

\[
\pi_2^E = (p - AC_2(\hat{q}))\hat{q} > \pi_1^E = (p - AC_1(\bar{q}))\bar{q}.
\]
Obviously real-world decision making will have to take into additional considerations into account. For example, the fishing firm is essentially a price taker, unless of course a niche market is developed and product differentiation can be used gain market advantage. As a price taker the firm will be exposed to global market forces, tariffs and exchange rate fluctuations. On the production side, expectations about fuel prices and the TACC would need to be factored into the investment decision.

**ACE trader**

The ACE trader illustrated in Figure 5 faces with a number of contractual opportunities. To narrow down the range of trading options it is assumed that two alternatives exist: (1) simple market exchange on an annual basis where the iwi sells quota through a broker; or (2) the iwi enters into a relational contract with a buyer which spans a number of years. With the first option, contracts of this nature are discrete, typically exchange is instantaneous, and there is no necessary prior relationship between the contracting parties (McNeil, 1978). The iwi entity has an endowment of settlement quota \( \tilde{q} \), it trades the ACE spawned by the endowment and receives a price \( p \), and the value of its settlement quota is \( v(\tilde{q}) \). The rate of return on settlement quota in this case is \( r^A_1 = \frac{p}{v(\tilde{q})} \). We can assume that expectations about
adjustments to the TACC, future product prices, harvesting costs, compliance costs, exchange rates, etc. are factored into \( v(q) \). The simple test to apply here is whether or not the return is greater than the return on the next best investment \( (r) \); is \( r^t > r \) ? If it isn’t and the quota can be sold then the owner should seriously consider selling. But of course, settlement quota does not readily impart this flexibility. However, within the constraints imposed by law the iwi could search out alternative buyers that returned at least the opportunity cost; or join up (horizontal joint venture) with other iwi to gain market power.

In contrast to discrete transactions, arrangements to use settlement quota could be governed by a long-term contract where the economic relationship spans a period of time. Contracting over a longer period may benefit both buyer and seller who wish to sustain an on-going mutually beneficial relationship. This is not a typical joint venture because the commitment spans quota holdings and does not involve equity participation. The following challenges arise from relational contracts: uncertainty surrounding the contracting environment (e.g. biomass levels, foreign exchange); the prospect of information asymmetries (e.g. the buyer having access to better information); and, restrictions that may alter use of the right (e.g. area closures, decrease in TACC). Longer term contracts, or what are often referred to as relational contracts, lack the specificity of a discrete contract because it is difficult (expensive) to write clauses that cover all contingencies. For example, the ACE buyer could seek out another ACE seller who is willing accept a lower price – contractual clauses to limit opportunistic re-contracting can be difficult to write. The take-or-pay contract that the government entered into with developers of the Maui gas field is a long-term contract, but not one that had much to recommend it on economic grounds (Sharp and Simon, 1992).
Joint ventures

Iwi with sufficient capital and quota can enter the industry by acquiring the assets of existing fishing firms. In this instance the decisions facing the iwi can be analysed along the lines similar to those presented above. However, rather than acquiring the assets of another firm the iwi could form a joint venture with another fishing entity, iwi or otherwise. The Act appears to impose few institutional barriers to forming either between MIOs and their subsidiary companies or with other commercial entities.

A joint venture is a shared equity enterprise where the participants commit less than all their resources and there is a mutual reliance relation in which both seller and buyer have reciprocal exposure of specialised assets (Williamson, 1983). For example, an iwi could form a joint venture with a vessel owning organisation by contributing quota and capital. Joint ventures can promote reciprocity and bind together complementary assets such as capital tied up in a vessel and settlement quota. As a form of governance, a joint venture shares the attributes of markets and internal organisations while attempting to weaken the hazards of each. It is typical for joint ventures to have limited scope and have a more or less fixed lifespan.

Figure 5: Three broad organisational arrangements beyond direct participation
A number of reasons for the creation of joint ventures can be identified:

(1) Create greater market power by combining quota holdings: by combining settlement quota iwi could potentially increase the price they receive for ACE from fishing entities. Rivalry can be managed by turning potential iwi competitors into allies.

(2) Generate economies of scale and scope: economies of scale provide an opportunity to lower the average cost of harvest thereby increasing unit profit. Economies of scope arise where the characteristics of production are such that the total cost of harvesting two species in the same firm is cheaper than harvesting the two species in separate single-product firms.

(3) Reduction of risk and risk sharing: risk management has two dimensions in the harvesting sector. One challenge is to increase the probability of profitable return on investment. Joint ventures could provide greater access to data and expertise that in turn improve the flow of information into decision making. Another challenge is to reduce the probability of purchasing quota that is unproductive. One obvious way of reducing exposure to this risk is to form a joint venture which builds up a portfolio of quota across species. However, if a joint venture is to perform better on average than others then it is necessary to have better than average information.

Competitive factors could motivate the formation of a joint venture in expectation of reducing rivalry among iwi and possibly reduce contractual. Once formed, however, competitive factors can contribute to future instability of the joint venture. The following factors can cause competitive rivalry: (1) disputes over residual (i.e. dividend policy) claims; (2) contests over the control of operations; and (3) concern over the loss of intellectual property. There is empirical evidence that competitive conflicts among partners increase with the growth of external opportunities (Kogut, 1989; Park and Russ 1996). For example, a partner to the joint venture might find it profitable to leverage off its settlement quota and invest in aquaculture reducing the prospect of cooperation in the future. The potential for this to occur is higher in growth industries. Shared investment – for example, a vessel and/or processing plant - is one way of weakening the incentive to disrupt the relationship because it penalises competitive behaviour.
How might stability be improved? First, building a joint venture culture of around reciprocity can improve stability. For example, the value of trust combined with equity shares could outweigh the benefits of non-cooperative behaviour. Mutual forbearance, trust and commitment, and respect for informational relational obligations can also work to suppress the incentive to act opportunistically. Second, joint ventures motivated by equity contributions, the transfer and creation of knowledge, and the pooling of skills can promote stability. Bundling contracts around these linkages can further cement the cooperative arrangement.

As the number of parties to a joint venture increase so too do transaction costs, managerial complexity and the chance of ex post disagreement. Furthermore the number of dyadic relationships increases geometrically and so does the chance that a dysfunctional pairing will undermine the relationship.

Joint ventures that have lasted for longer terms (say beyond 5 years) are characterised by more stable relationships and horizontal ties that encourage technological transfer and cooperation. It is axiomatic that agreement among entities to a joint venture will last as long as the benefits of defecting are perceived to be outweighed by the benefits of further cooperation (Kogut, 1989).

**Vertical joint-ventures**

Transaction cost economics, as proposed by Williamson (1979), provides the following reasons why vertical joint-ventures might add value.

1. **Asset specificity, complexity and uncertainty**

Commercial fishing firms, to varying degrees, invest in vessels and harvesting technology that is specialised and directed at targeted species. Obviously there will be some flexibility in the firm’s asset base but to some extent the capital tied up will be specific to the firm’s operations. If the firm is a buyer of ACE in the market then it faces the possibility of supplier hold-out if the cost of switching to a new supplier is sufficiently high. Alternatively, the supplier of ACE has an asset specific investment because the rights to fish are defined by species and area. The supplier of ACE faces the possibility of buyer hold-out when the buyer demands price concessions. The prospect of hold-out hazards increases with uncertainty and complexity and make the
writing of complete contracts difficult (Williamson, 1979). In these situations a vertical joint-venture may offer mutual benefits to both the supplier and buyer of ACE.

2. Financing vehicles
The supplier of ACE typically owns and finances the activities necessary for quota asset management. Faced with budget constraints the supplier may be unable to provide ACE at an optimal time during the fishing season because of poor quality information. Structuring the relationship as a vertical joint-venture could enable the supplier to secure access to the finance necessary to enhance the quality of information. The buyer owns part of the venture and can place a relatively high value on the venture because it supplies the ACE when needed.

3. Risk sharing
Join ventures allow ACE suppliers to share risks with commercial fishers. Risk sharing might be beneficial if parties are less diversified.

**Horizontal joint-ventures**
According to Berger and Ofek (1995) combinations of dissimilar firms can reduce value of the going concern by contributing to the growth of bureaucracy, lack of focus and cross-subsidisation of poor performing units. Although there is considerable variation in the settlement quota distributed to iwi entities it seems reasonable to assume that they share a common goal viz. to enhance the value of their assets. In this respect horizontal (that is, at the level of ACE supply) joint-ventures offer opportunities for value enhancement through the following: (1) economies of scale; (2) market power; and (3) exploiting complementarities and managerial skill.

**Empirical evidence**
Johnson and Houston (2000) examined financial data relating to joint venture announcement over the period 1991-95. They found that announcements of horizontal joint ventures elicit wealth gains that are positively correlated across the partners. For vertical joint-ventures, only the suppliers experienced positive wealth gains, and buyer and seller wealth gains were not correlated. They also found that firms choose joint ventures when the hold-out hazard is high and when suppliers face finance
constraints. Interestingly, they find no evidence that firms choose joint ventures to share risks.

Kent (1991) reports on an empirical study comparing joint ventures and non-joint ventures in the petroleum industry as they compete for oil and gas leases. While enjoying the benefits of market power, he finds that joint ventures don’t perform any better than non-joint ventures at finding productive leases and, because they pay a higher price for productive leases, the overall performance of joint ventures is lower. The apparent premium being paid for participation in joint ventures was not answered.

5. Conclusions

Twenty years is a long time to wait for settlement assets. To put this wait in perspective, if $1 was invested in 1987 at 10%, with the interest re-invested each year, the $1 would be worth $6.72. Time carries with it a price. The transfer of fishing assets to iwi creates both an opportunity and a challenge. Opportunities are de-limited by both the Maori Fisheries Act 2004 and the Fisheries Act 1996. Initial entitlements and the quality of settlement quota are important determinants of wealth creating possibilities. The quality of settlement quota is relatively high by international standards; but not, I suspect, as high as regular quota.

At this stage of the transfer of settlements assets to iwi it has not been possible to analyse the distribution in any detail. However, a simple analysis of the allocation of income shares in AFL point to a concentration of assets. If a similar pattern emerges with the distribution of quota assets it will be clear that the endowments of iwi are not uniform. Some will be able to use their settlement quota to expand existing commercial operations, taking advantage of latent economies of scale and scope. Others will receive small and possibly quite carried entitlements; but they too will face a choice of going it alone and simply trading ACE or forming an alliance with other iwi groups to gain market power, share knowledge and market skills. Iwi can, of course, enter into vertical joint venture arrangements and combine their settlement quota with a partner’s capital.
This paper has explored the range of possible organisational developments and offered some principles that iwi might use when assessing the opportunities that lie ahead. One size most definitely will not fit all. Setting complexity aside, the fundamental goal is to add maximum value to settlement quota, and to achieve this goal iwi are advised to adopt the opportunity cost principle when analysing the options.
References


