Determinants of Innovation and Growth in the Seafood Sector
NZ Seafood Week Conference 18-19 May 05

The Mira Szászy Research Centre and
the National Institute of Water and
Atmospheric Research (NIWA),
Images – courtesy of NIWA
Joint Research Venture

- Mira Szászy Research Centre for Māori and Pacific Economic Development, The University of Auckland Business School
- National Institute of Water and Atmospheric Research (NIWA)
- $1.4 million research grant funded by FRST
- 4 year project started in 2003
Competitiveness Indicators

- Growth
- Value-added
- % of world market share
- Volume
- Innovation / technology uptake
Basic Information - World

• World Production:
  – 130.2M tonnes (2001)
    • 37.9M tonnes (2001) – aquaculture
• Overall increase in growth, esp. in aquaculture
• Higher value-added in aquaculture
• China main producer in both areas (aquaculture)
• Thailand main exporter, then China
Basic Information - NZ

- Fish and shellfish processing largest part of the industry (value) (2x value-added relative to ocean and coastal fish)
- Exports:
  - 79% of fish and shellfish processing (0.8% of GDP)
  - 27.7% of ocean and coastal fishing exported (rest mainly to processing)
  - Total fishing exports: 5.6% of NZ total merchandise exports
    - Processed: 20.5%
    - Finfish: 69%
- Concentration of industry (>35%)
  - Nelson, Canterbury, Auckland, Marlborough
Efficiency Gains

- Capital-labour ratio doubled
- Average output increased
- Labour units decreased
- Output per labour unit increased by 70%
- Examined production efficiency at two points in time
  - 1993 and ten years later in 2002
- Industry has produced strong efficiency gains:
  - As a group, the mean level of efficiency has increased (significant) and the variance of inefficiency decreased.
  - Measured in terms of cost reduction, the annual average rate of gain is about 3-4%.
Distribution of Efficiency

![Graph showing the distribution of efficiency for 2002 and 1993. The x-axis represents enterprise efficiency, and the y-axis represents the number of enterprises. The graph indicates a higher concentration of enterprises with higher efficiency in 2002 compared to 1993.](Image)
Rate of Technical Progress
Creating Wealth from Allocated Assets

Māori People Making Use of Fisheries Assets
Kaupapa Māori – Māori Stakeholder in Seafood Sector

- Explore contemporary issues relating to governance, including an assessment of organisational arrangements at the iwi level for the effective/efficient use of fishing proprietary rights (obligations)
- Initial assessment of current innovation state & capability for economic growth
- Increase participation of Māori in the sector
- Comparative innovation study Māori & North American First Nations
INTRODUCTION

• Central Institutional Frameworks
  – Iwi Input
  – The Allocation Model
  – Māori Fisheries Act 2004 requirements for Iwi

• Two Contrasts of Iwi Governance Models:
  – Ngāi Tahu – Te Wai Pounamu
  – Ngāpuhi - Te Tai Tokerau

• Tribal Innovators – Māori and North America First Nations
To date, there has been little indication of what organisations intend to do long-term with their allocated assets.

Iwi organisations seem to have spent much of their time trying to meet the MFA requirements to become mandated:
- Establish a structure of governance to ensure that assets are used to benefit the iwi they represent.
Patai - What then must iwi do?

- What could iwi organisations do to efficiently use their allocated assets?
- How can they add value to their assets?
- Assess:
  - Coastlines – need to have reached agreement with neighbouring iwi
  - Harbours and water quality etc.
  - Quota Management Areas (QMA’s)
  - Species
  - Population (workforce)
Add value to assets incl. quota

• Identify species in the local iwi area
  – Quality: Are they high value in terms of export?
  – Quantity: Are there a lot?

• Workforce – iwi population and job opportunities
  – human capital enhancement

• Identify aquaculture opportunities

• Leasing or selling quota?
Māori & North American First Nations in Seafood

- Initial Comparative study – University of Arizona & Harvard Project for American Indian Economic Development
- Dr Manley Begay, Director, Native Nations Institute, Tucson, Arizona
- Comparison of selected tribal innovators – Parengarenga Fish Farm-Kingfish
Initial Assessments

- Iwi focused on receiving assets
- Strong governance focus of Māori/Iwi i.e. on the broader political factors and not yet on economic factors – grievance resolution
- Little indication of the strategic intent – i.e. what iwi intend, long-term, to do with their assets
- Not yet clear how iwi will add value to quota
- Change of mind-set & behaviour needed for innovation & economic growth
- Human capital enhancement - Find/train commercial leaders for innovation and economic growth
What is innovation?

• Introduction of a new or significantly improved product or service

• Introduction of a new or significantly improved process within a business

• Introduction into a significant new market opportunity

• Introduction of a significantly improved organisational arrangement
Why is innovation important to industry?

• Innovation activity a driver of economic growth, sector & individual business success

• Strong political & financial support from current Government – “Growth & Innovation Framework”
Innovation in NZ seafood industry

Seafood Industry Top 3 for Innovation

NZ Stats 2004

Innovation Rate = No. of firms introduced a product or process innovation in the last 3 yrs.
Innovation Status
NZ Seafood Industry

High innovation activity only 14% of firms no innovation spending, nationally 26%

• Seafood exports fourth highest level of value adding 72% vs Meat 51%, dairy 35%, fruit & vege 35%

• But value-adding in seafood is not growing as quickly as other sectors
Innovation in NZ seafood industry

Key Issues:-

• Focus on production, process & quality innovation – rather than further down the value chain

• High proportion of research expenditure on resource information - bureaucracy a business obstacle.

• Poor integration of industry with sources of innovation expertise – using in-house R & D

• Low sector investment in R & D.
Year

Total New Zealand Aquaculture Production (Tonnes)
0 2000 4000 6000 8000 10000 12000 14000 16000 18000 20000

- Greenshell mussel
- Chinook salmon
- Pacific oysters

Chinook salmon
Pacific oysters
Greenshell mussel

THE UNIVERSITY OF AUCKLAND
BUSINESS SCHOOL
Innovative Use of Marine Farm Space

About 4,000 hectares total growing space

- Mussels: ~$24,000/hectare - $50M industry needs 2,000ha
- Oysters: ~$110,000/hectare - $50M industry needs 450ha
- Finfish: ~$3-5,000,000/hectare - $50M industry needs 16ha

N.Z. - 160,000 tonnes = NZ$280M = NZ$1,750 per tonne

Versus

Australia – 30,000 tonnes = A$680M = A$22,667 per tonne
Why should the Govt invest in the NZ Seafood Industry?

• Fifth largest primary industry
• Fourth largest export earner $1.4b
• 50% seafood firms high export (>50% sales) vs 7% of all NZ firms
• About 90% of harvest exported to >80 countries
• Employs >26,000
• Growth – exports 7% p.a. for 20 years - growth target of $2b by 2010
• Regional development
• Very high Maori stakeholding
• Innovation savvy
Can innovation be encouraged?

Yes - through policy & funding:-

• Industry-science relationships
• Industry/market networks – clusters
• Growing & directing people skills & know-how
• Fostering innovation investment
• Encouraging IP commercialisation
• Building international linkages & networks – markets & knowledge
Innovation in NZ seafood industry

Key Issues :-

• Industry focus on production & process innovation vs further down the value chain

• We need:-
  - Industry management awareness
  - Research providers more focussed

• High proportion of research expenditure on resource information & bureaucracy a business obstacle & not wealth creation

• We need:-
  - Government needs to be brought on side
  - Industry needs to work together – good models e.g. Industry Development Framework
Innovation in NZ seafood industry

Key Issues:

Relatively low industry investment in R & D, especially amongst small firms

- We need:
  - Use industry clusters or more effective help-schemes

Poor industry & science provider linkages, heavy reliance on in-house innovation

- We need:
  - Stronger industry and research linkages
  - More collaborative research & business environment
The Challenge

The challenge is to build a framework & business environment that fosters innovation in the seafood industry.
Value-chain/Product Innovation: Insights from NZ King Salmon & the MacLab group

A/Prof Jay Sankaran.
Need to trade-off “Pure R” VS “D”

• Arises out of the integration of farming and processing.
• Drivers of production research.
  – Slow maturation of the species.
  – Seasonality of maturation cycles.
  – The very location of value-addition: the fish farm.
    • Easier to add value to a lower-cost raw material.
• Drivers of developmental research.
  – Possible difficulty in farming the species.
    • By-product utilization (high marginal returns).
    • Criticality of not destroying value once harvested (e.g., by poor slicing), given the long maturation cycles.
    • E.g., salmon kebabs (seal-bitten, scale-damaged salmon).
• A process model of value-chain innovation that is applicable for integrated, niche aquaculture firms.
Lessons to learn from NZ King Salmon

• R&D pays off!
• Tension between “pure R” and “D.”
• Innovation needs to be clearly driven by and aligned with competitive strategies.
  – The process model of innovation would be relevant for integrated niche aquaculture firms.
• Need to create a culture of innovation.
  – Pursuing ideas from the coalface, serendipity.
• Customer/market-focus in new product development (NPD): locate NPD in Sales & Marketing, strong links between R&D and marketing.
• Cross-functionality in the R&D effort.
Innovation and Commercialization of Marine Bioactives
Lessons for the Seafood Sector

- Need for research collaboration.
  - Firms that attempt to introduce innovations that are ‘new to the market’ (e.g., Lyprinol®) than ‘new to the firm’ (e.g., powder extract) are far more likely to engage in cooperative arrangements.
- Risk associated with radical innovations is apparent at two stages: development and introduction (Korescu et al., 2003).
  - Development stage: “When and whether a process directed at creating breakthroughs will materialize into actual, ready-for-market innovations.”
  - Introduction stage: “Extent and time frame of consumers’ adoption of the product.”
An Approach for Managing Risk

1. Along with natural product chemists, search traditional medicinal and folkloric knowledge bases (e.g., from islands in the S. Pacific that rely on seafood), and related epidemiological evidence, for ideas for marine bioactives with commercial potential as nutraceuticals.
   ▪ E.g., usefulness of fish species for folk medicine of fishermen.
2. Screen ideas on the basis of the size of the potential market(s).
3. As applicable, evaluate the feasibility of farming the source organism(s) and/or harvesting them in the wild in a sustainable way.
4. Screen ideas yet again on the basis of yield factors and cost as well as reliability and scalability of farming/harvesting the source organism(s).
5. In parallel,
   - Embark on the search for ‘marker’ metabolites; if they can be isolated and elucidated, investigate methods for industrial-scale synthesis.
   - Establish scientific documentation of the therapeutic efficacy of the marine extract through research collaboration between natural product chemists and relevant medical, pharmacological, and clinical specialist researchers as dictated by traditional medicine/folklore.
“adding knowledge and profit to your business”

http://www.business.auckland.ac.nz/seafood