Agri-food Value Chains in Sri Lanka

Dairy and Fisheries Value Chains

Dilani Hirimuthugodage
Outline

• Introduction to National Science Foundation (NSF) Research Study
• Objectives and outputs of the main study
• Specific objectives
• Conceptual framework
• Methodology
• Results
  – Fisheries Sector
  – Dairy sector
• Summary
National Thematic Research Programme on Food Security – NSF

A Study of Demand and Supply Behaviour Relating to Rice, Fisheries and Livestock (dairy) Products in Sri Lanka

Food security

- Availability (Supply)
- Accessibility (Demand)
- Stability (Price)
- Utilization (Food intake)
# Concepts and methods

<table>
<thead>
<tr>
<th>Pillar</th>
<th>Activities</th>
<th>Policy Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability</td>
<td>• Supply analysis of rice, fish and livestock products</td>
<td>• Supply side and price policies</td>
</tr>
<tr>
<td></td>
<td>• Value chain analysis of rice, fish, livestock</td>
<td></td>
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<tr>
<td>Accessibility</td>
<td>• Demand/consumption analysis of rice, fish and livestock products</td>
<td>• Demand side consumption support policies</td>
</tr>
<tr>
<td></td>
<td>• Value chain analysis of rice, fish, livestock</td>
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</tr>
<tr>
<td>Utilization</td>
<td>• A limited assessment of utilization/nutrition of three food types</td>
<td>• Consumption, health and nutrition policies</td>
</tr>
<tr>
<td>Stability</td>
<td>• Projection of future availability and demand</td>
<td>• Impacts of directly and indirectly impacting policies</td>
</tr>
<tr>
<td></td>
<td>• Institutional and policy analysis</td>
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</table>
Objectives of food security study

- Understand the nature of demand formation and supply response relationships of rice, fisheries and livestock products

- Analyze value chain relations and identify market structures of rice, fisheries and dairy products

- Identify institutional and technical constraints that hamper efficient functioning of markets of rice, fisheries and livestock

- Recommend feasible policy interventions to overcome the identified barriers in the existing market structure
Outputs

• A selection of quantitative structural models for explaining and forecasting in demand and supply of rice, fisheries and livestock products

• An analysis of rice, fisheries and livestock products markets using combined a framework of value chain analysis and Structure, Conduct, Performance (S-C-P) model

• An analysis of barriers (institutional, technical, socio-cultural etc.) which hamper the smooth market functioning

• Recommendations to bridge existing policy gaps
Value chain analysis

Dairy sector

Marine fisheries
Research Objectives

1. Identify and define actors and enabling factors in the dairy and marine fisheries sector value chains in Sri Lanka
2. Examine characteristics and market structures of dairy and marine fisheries sector in Sri Lanka
3. Analyse and quantify market power and market concentration of selected value chain actors
4. Propose feasible policy options to improve market availability, accessibility and affordability of dairy and marine fisheries products
A value chain consists of all value-generating activities required to produce, deliver and dispose of a commodity (H. Schmitz 2005).
Agri-food value chain

Source: The Agricultural and Food Value Chain (https://www.kpmg.com)
Research Methodology

The methodology of the study consists of both quantitative and qualitative methods.

Objective 1
(identify dairy & fisheries value chain)

- Literature review
- Key Informant Interviews –
  - Government officials (Ministries, Departments, Authorities etc.)
  - Policy makers
  - Exporters and Importers
  - Dairy and Fisheries Association etc.
- Focus Group Discussions (FGDs)-
  - Dairy farmers, smallholders, producers, collectors
  - Fishermen, input suppliers, exporters, importers etc.
Objective 2
(Examine market structure of dairy & fisheries value chain)

- Identifying different layers in dairy & fisheries value chain
  - Production level
  - Collection level
  - Wholesale level
  - Retail level
  - Processing level
  - Exporting level
  - Importing
  - Consumer level

- Analyse market structure in each layer by using **Structure, Conduct, Performance (S-P-C)** analytical tool
**Structure:**

Market structure is the organisational and other characteristics of a market.

Characteristics of a market which affect the degree of competition between firms and their pricing decisions.

The number and size distribution of buyers and sellers.

The existence or absence of barriers to entry and exit.

**Conduct / Behaviour**

How does market structure affect pricing, output and other decisions of businesses within the market?

Are there dominant firms?

Is there evidence of anti-competitive behaviour?

**Performance**

Does the conduct of firms give rise to efficient outcomes?

Economic, Social, political outcome.
Structure- Conduct- Performance Analysis

**STRUCTURE**
- Buyer concentration
- Seller concentration
- Barriers to entry

**CONDUCT**
- Buying strategies
- Selling strategies
- Pricing strategies
- Product differentiation
- Advertising
- Innovation
- Competition & cooperation

**PERFORMANCE**
- Economic outcome
- Social outcome
- Political outcome
- Environmental outcome
Objective 3
(Quantify market power and market concentration of the two sectors)

- Herfindhal-Hirschman Index (HHI Index)
- \( HHI = a^2 + b^2 + c^2 + d^2 \)
  - \( a^2 \) = square of market share of firm a
  - \( b^2 \) = square of market share of firm b
  - \( c^2 \) = square of market share of firm c
  - \( d^2 \) = square of market share of firm d

- Markets can be classified into three types:
  - Un-concentrated markets: where, HHI below 1500
  - Moderately concentrated markets: HHI between 1500 and 2500
  - Highly concentrated markets: HHI above 2500
Data Analysis

- Existing literature were mainly analyzed and categorized according to the three main objectives
- Qualitative primary data, from FGDs and KIIIs were analyzed by using NVIVO-10 qualitative data analysis software
- Secondary data were analyzed through spreadsheet applications
Existing Dairy Value chain

- Input
- Packaging and Marketing
- Processing
- Chilling Center
- Collecting Centers
  - Large scale (over 20 cows)
  - Medium scale (5-20 cows)
  - Smallholders (1-5 cows)

- Consumers
- Liquid milk
- Domestic Production
- Processing
- Farmer's Collecting Centers
- Liquid milk

- Imports
Identifying Dairy Value chain

**Marketers**
- 27 marketers

**Importers**
- 5 main importers (Fonterra, Nestle, Maliban, Sathosa, Lanka milk foods)

**Processors**
- 27 main processors

**Chilling Centers**
- Milco (81)
- Nestle (107)
- K co-op
- Cargills
- Fonterra

**Collecting Center (2,999)**
- Milco (76)
- Nestle (1,200)
- K co-op
- Cargills
- Fonterra (7)

**Production (217,297 farms)**
- Large scale farms (17,244 farmers)
- Medium scale farms (70,291 farmers)
- Smallholders (131,698 farmers)

**Input Supply**
- Veterinary Service (331 offices)-DoAPH
- Animal feed –Pvt sector
- Breeding Materials-NLDB, Pvt

**Export**

Analyzing market structure

Producer level

1. Homogeneity product
2. Large number of producers
3. Price takers – depend on the quality
4. No barriers to entry/exit

Highly Competitive market behaviour
Analyzing market structure

**Collection level**

1. Few firms are involved in the business
2. Price maker (can influence on pricing)
3. Entry barriers (capital on chilling centers, coolers, transport etc.)

**Oligopoly market structure**
Analyzing market structure

Processor level
1. Selected number of firms
2. Same products in different brands
3. Price maker?? (can influence in pricing)
4. Entry barriers (capital, registration etc)

Oligopoly market structure
Analyzing market structure

Importer level

1. Few number of firms
2. Price taker (CAA determines Price but importers can influence on price)
   • Entry barriers

Oligopoly Market Structure
Measuring Market Power

**Market power at producer level**

\[ \text{HHI} = 60^2 + 25^2 + x^2 + y^2 + z^2 \ldots \ldots + \text{etc} \]
\[ \text{HHI} = 4225 + x^2 + y^2 + z^2 \]

Highly concentrated Market

**Market power at collection level**

\[ \text{HHI} = 40^2 + 2.5^2 + x^2 + b^2 + c^2 + \ldots \ldots + \text{etc.} \]
\[ \text{HHI} = 1600 + 6.25 + x^2 + b^2 + c^2 + \ldots \ldots + \text{etc.} \]

Moderately concentrated market

**Market power at chilling center level**

\[ \text{HHI} = 45^2 + 34^2 + a^2 + b^2 + c^2 \]
\[ \text{HHI} = 2025 + 1156 + a^2 + b^2 + c^2 \]

Highly concentrated market
# Matrix Analysis on Value Chain Actors

<table>
<thead>
<tr>
<th>Functions / VC layers</th>
<th>Actors</th>
<th>Supports / Discourages</th>
<th>Influencers</th>
</tr>
</thead>
</table>
| Input supplying       | • Department of Animal Production and Health – Veterinary Service  
• Animal feed providers – pvt sector  
• Breeding material providers – NLDB , pvt sector  
• Cattle sellers | • Prices of cattle feeds are increasing as some of the byproducts of bran, grain, dhal, punacks are exporting and not available in the local markets.  
• Government procedures in transporting cattle discourage dairy farmers in buying better breeds | • Government – introduce new hybrid grass varieties (CO$_3$)  
• Many government departments and programmes are conducted for animal husbandry (programme of enhance pasture development programme) |
| Producing             | 217, 297 producing farms in island wide  
• 17,244 large scale farms  
• 70,291 medium scale farms  
• 131,698 smallholders | • Government provides some equipment such as milking cans, vitamins, boots etc freely and at a subsidized price  
• Lack of flexibility in incentive programmes  
• NLDB cattle breeding programmes  
• Cost of production is high | • Government sponsored trainings –foreign  
• Training programmes conducted by the Department of Agriculture  
• DoAPH provides training, extension and field services |
| Collecting            | 2,999 collecting centers are in island wide  
• 1200 – Nestle  
• 76 – Milco  
• District level collectors : Kaduwela Cooperative, Nawalapitiya Co-op, Cargills, Fonterra etc. | • Farm-gate price is determine by private companies and cooperative societies  
• Occasionally, some collectors maintain fixed prices in buying milk | • Government decides minimum price per liter |
Matrix Analysis on Value Chain Actors cont..

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<thead>
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<th>Influencers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing</td>
<td>27 main processors</td>
<td>• High cost of production (high electricity cost, equipment wear and tear cost etc.)</td>
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</tbody>
</table>
| Importers             | 5 main importers – Fonterra, Nestle, Maliban, Sathosa, Lanka Milk Foods.| • Problems of quality assurance
                                                                        • No compulsory standards. Some follow Sri Lankan standards & some international standards.
                                                                        • Law enforcement in import quality very poor                                      | • Government has imposed a cess on imported milk powder                         |
| Retailing             | District retailers                                                     | • Local milk powder producers have to pay Rs.125 as trader’s commission                 |                                                                            |
| Consuming             | • Local consumers
                                                                       • Foreign consumers                                                                   | • Government promote fresh milk consumption                                      | • Government intervenes in milk powder pricing                                  |
## Conclusions and Recommendations

<table>
<thead>
<tr>
<th>Levels of Value Chain</th>
<th>Identified issues</th>
<th>Recommendations</th>
<th>Responsible institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input supplier</td>
<td>High prices of inputs due to lack of supply</td>
<td>Government intervention in pricing, especially in cattle feed,</td>
<td>Ministry of Livestock &amp; Rural Community Development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Avoid exporting cattle fees as raw materials of other products</td>
<td>NLDB</td>
</tr>
<tr>
<td></td>
<td>Lack of coordination amongst institutes</td>
<td>Introduce an effective system to connect institutes involved in dairy sector</td>
<td>Ministry of Livestock &amp; Rural Community Development</td>
</tr>
<tr>
<td></td>
<td>Difficulty in transporting cattle &amp; buffalos— Needs to obtain permits and permission from Veterinary Surgeon, Grama Niladhari, Police etc.</td>
<td>Less restrictions on animal transportation especially cattle and buffalos</td>
<td>Ministry of Livestock &amp; Rural Community Development</td>
</tr>
<tr>
<td></td>
<td>Sometimes cattle donation programmes (when they donate cows with diseases) interrupt existing farms</td>
<td>Donations of cattle needs be in good health &amp; it should be given only to those who are involved in the industry.</td>
<td>Department of Animal Production &amp; Health</td>
</tr>
<tr>
<td></td>
<td>Good breeds should be discouraged to send to slaughter houses.</td>
<td>Introduce a mechanism to buy good breed who are supposed to send to slaughter houses</td>
<td>Ministry of Livestock &amp; Rural Community Development</td>
</tr>
<tr>
<td></td>
<td>Lengthy and inefficient procedure in obtaining bank loans</td>
<td>Simplification of the procedure of obtaining bank loans</td>
<td>Ministry of Livestock &amp; Rural Community Development</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Ministry of Traditional Industries &amp; Small Enterprise Development</td>
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## Conclusions and Recommendations

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<td></td>
<td><strong>Producers</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Medium and large scale| Difficulties in obtaining bank loans                                              | Provide substantial loan facilities for farmers and provide easy methods in obtaining loans | Ministry of Livestock & Rural Community Development  
Ministry of Traditional Industries & Small Enterprise Development                      |
|                       | High prices of cattle feed                                                        | Government intervention in cattle feed pricing, pricing of cattle etc.          | Ministry of Livestock & Rural Community Development  
Department of Animal Production & Health  
NLDB                                                                                   |
|                       | No proper trainings to manage farm                                                | Awareness programmes to mitigate communicable diseases, immunization, and sickness treatment among animals.  
Provide assistance for farmers and knowledge sharing. Eg: E.g.: Efficient ways of milking cows, proper feeding practices for expecting cows and cows who are feeding etc. And also provide intermediary service to resolve problems arriving in livestock activities. | Department of Animal Production & Health  
Ministry of Livestock & Rural Community Development  
Ministry of Traditional Industries & Small Enterprise Development                      |
|                       | No second generation of cattle as it is difficult to maintain calves              | Promote local breeding rather than imported breed, as sometimes foreign breeds cannot be assured whether, they will adapt to environmental conditions in Sri Lanka. Most of the time these breeds become unsuccessful. | Ministry of Livestock & Rural Community Development  
NLDB                                                                                   |
|                       | Lack of flexibility in incentive programmes                                        | Re-organize incentive programme structure to attract dairy farmers and development activities needs to be mainly focused on smallholders | Department of Animal Production & Health  
NLDB  
Ministry of Livestock & Rural Community Development                                  |
|                       | Scarcity of land and inability of using abandon paddy lands                       | Change provisions in using abandon paddy lands to dairy industry                | Ministry of Livestock & Rural Community Development  
Ministry of Lands                                                                      |
|                       | High production cost (cattle feed, high cost in highbred cattle varieties)       | Provide financial assistance to bring up calves till they are grown up and promote breeding local varieties | Ministry of Livestock & Rural Community Development  
NLDB                                                                                   |
# Conclusions and Recommendations

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<th>Recommendations</th>
<th>Responsible institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collectors</td>
<td>Lack of equipments in doing quality testing</td>
<td>Provide technical and financial assistance in using and buying equipments</td>
<td>Department of Animal Production &amp; Health Industrial Technology Institute</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sri Lanka Standards Institute</td>
</tr>
<tr>
<td>Collectors</td>
<td>Lack of storing facilities at individual collector levels</td>
<td>Provide incentives/ easy payment methods in buying storing equipments</td>
<td>Ministry of Livestock &amp; Rural Community Development</td>
</tr>
<tr>
<td></td>
<td>Lack of flexibility in incentive programmes: such as milking machines purchased at concessionary terms cannot be sold and has to be kept in one place only</td>
<td>Introduce more flexible incentive schemes</td>
<td>Ministry of Livestock &amp; Rural Community Development</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ministry of Finance &amp; Planning</td>
</tr>
<tr>
<td>Chilling</td>
<td>High operational cost</td>
<td>Introduce easy payment scheme, provide incentives or introduce new electricity tariff to dairy producers</td>
<td>Ministry of Livestock &amp; Rural Community Development</td>
</tr>
<tr>
<td></td>
<td>Lack of knowledge in proper hygienic conditions, clean environment  practices etc.</td>
<td>Provide training for farmers to make aware of these good practices Organize workshops to conduct these trainings Nominate trainers from corporative societies</td>
<td>NLDB and Department of Animal Production and Health</td>
</tr>
<tr>
<td>Levels of Value Chain</td>
<td>Identified issues</td>
<td>Recommendations</td>
<td>Responsible institute</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>Processing</td>
<td>High operational cost</td>
<td>Introduce easy payment scheme, provide incentives or introduce new electricity tariff to dairy processors</td>
<td>Ministry of Livestock &amp; Rural Community Development</td>
</tr>
<tr>
<td>Processing</td>
<td>Lack of modern technology and equipments</td>
<td>Introduce new technology through foreign trainings, workshops etc</td>
<td>Ministry of Livestock &amp; Rural Community Development</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Dairy development Milk Procurement &amp; Processors Association</td>
</tr>
<tr>
<td>Importers</td>
<td>Meeting quality standards- not sure of which standards to use- local/ international</td>
<td>Introduce a new policy on testing and quality standards</td>
<td>Consumer Affairs Authority</td>
</tr>
<tr>
<td>Importers</td>
<td>High cost for storing, repackaging</td>
<td>Provide incentives/ easy payment mechanisms to milk importers as well.</td>
<td>Ministry of Livestock &amp; Rural Community Development</td>
</tr>
<tr>
<td>Retailors</td>
<td>Difficulties in distribution due to proper infrastructure facilities</td>
<td>Establish retail shops and government distribution centers island-wide</td>
<td>Ministry of Co-operative and Internal Trade</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ministry of Livestock &amp; Rural Community Development</td>
</tr>
<tr>
<td>Consumers</td>
<td>High price in milk powder and some of the other dairy products (butter, cheese etc.)</td>
<td>Government involvement in pricing of other dairy products</td>
<td>Consumer Affairs Authority</td>
</tr>
</tbody>
</table>
## Fisheries Value Chain (Work – in Progress)

<table>
<thead>
<tr>
<th>Value chain layer</th>
<th>Activity</th>
<th>Market influencers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Importing</strong> (Canned fish, Dried fish, Maldives fish)</td>
<td>Imported fish goes to Peliyagoda fish market, selected wholesalers and retail shops</td>
<td>Sri Lanka Customs</td>
</tr>
<tr>
<td><strong>Exporting</strong></td>
<td></td>
<td>MFAR, EDB</td>
</tr>
<tr>
<td><strong>Processing</strong> 35 approved processing companies (DFAR)</td>
<td>From Selected Retailers and wholesalers from the entire island</td>
<td>MFAR</td>
</tr>
<tr>
<td><strong>Retail trading</strong></td>
<td></td>
<td>MFAR</td>
</tr>
<tr>
<td><strong>Wholesale Trading</strong></td>
<td></td>
<td>MFAR</td>
</tr>
<tr>
<td><strong>Collection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Production</strong></td>
<td>60 % from coastal fish 40 % from deep sea fish</td>
<td>Ministry of Fisheries &amp; Aquatic Resources (MFAR), CFHC,NARA,</td>
</tr>
<tr>
<td><strong>Input Suppliers</strong></td>
<td>(Manufacturing and repair of boats – day fishing crafts, multi-day fishing crafts, fishing net)</td>
<td>Cey-Nor Foundation Ltd.</td>
</tr>
<tr>
<td><strong>Input suppliers</strong></td>
<td></td>
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</tr>
</tbody>
</table>

### Activity Details

- **Importing**
  - Canned fish, Dried fish, Maldives fish go to Peliyagoda fish market, selected wholesalers and retail shops.

- **Exporting**
  - Excess goes to local market (selected outlets).

- **Processing**
  - 35 approved processing companies (DFAR) from Selected Retailers and wholesalers from the entire island.

- **Retail trading**
  - MFAR

- **Wholesale Trading**
  - MFAR

- **Collection**
  - CFC

- **Production**
  - 60% from coastal fish
  - 40% from deep sea fish

- **Input Suppliers**
  - Manufacturing and repair of boats – day fishing crafts, multi-day fishing crafts, fishing net
Calculating market power

• Canned fish importers
  – Five main importers
  – Market share of main importers

<table>
<thead>
<tr>
<th>Company</th>
<th>Market share as a %</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>20.1</td>
</tr>
<tr>
<td>B</td>
<td>11.3</td>
</tr>
<tr>
<td>C</td>
<td>7.4</td>
</tr>
<tr>
<td>D</td>
<td>6.3</td>
</tr>
<tr>
<td>E</td>
<td>4.7</td>
</tr>
</tbody>
</table>

– HHI = 400 + 127 + 54 + 39 + 22
– HHI = 642
– Un-concentrated markets: where, HHI below 1500
Market performance - pricing

• Price determine according to demand and supply
  – March- April, August-September (fish production is high- prices are low)
  – During festival seasons – December prices are high

• In general – inelastic demand for fish

CFC – to control fish prices
Operate in 21 Districts
Selling fish @ cheaper rates
• Prices are determined based on fish amount received in each day
• 154 wholesalers & 30 retailers
• 5 importers
Summary of fisheries value chain

• Marine fisheries value chain is complex with many actors and enabling factors
• Different layers of the value chain have different market structures and behaviours
• Performance of each layer needs to be analyzed to assess the overall industry performance
• Need of a proper pricing mechanism was highlighted
  – Need of proper post-harvesting techniques (preserve nutrition and control prices)
Thank You !