Economic analysis for Australian Seafood Chains: development and application of a generic value-chain model

Application on three fin-fish companies for their value-added contribution to the Western Australian economy

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1.0 Introduction

This report is the result of a study undertaken by the Centre of Excellence Science Seafood & Health (CESSH) and the Department of Agriculture and Food Western Australia (DAFWA) as part of the Seafood CRC Project improving the Supply chain for selected WA Seafood Products The primary objectives of this study are to:

- develop a generic value chain model for Australian seafood industries with a future aim to apply the model to quantify the impacts of interventions (either policy or research innovations) on the industries economic performance;
- apply the model on a trial basis on three participating fin-fish companies in Western Australia; and
- to understand their share of value added contribution to the economy along the whole supply chain.

The report presents briefly the theory, concepts and steps used to develop a generic value chain model for Australian Seafood Industry (ASI) and then describes the structure, assumptions and results of the "Value Chain" models for three Fin-fish company cases (company names are kept anonymous due to their business and data confidentiality agreements).

The contents of this report are arranged in 6 sections. The theory, modelling procedures, and application of the generic model are described in Section 2, 3 and 4 respectively. Section 5 provides summary results and relevant discussion on the contributions of three fin-fish companies operating in WA. Section 6 presents concluding comments.

2.0 The value chain model

Academics and practitioners have long described the stages in the process of creating value in the physical world as links in a "value chain". The value chain concept is developed from the business management discipline and that was first described and popularised by Porter (1985). Since then the value chain concept is extended to many levels in terms of small to large business entities and also in terms of local to global links (Kaplinsky and Morris, 2000; Chang and Makatsoris 2001, Olla and Patel, 2002; and Gereffi, 2003). The value chain model describes a series of value-adding activities connecting a company's supply side (raw materials, inbound logistics, and production processes) with its demand side (outbound logistics, marketing, and sales). By analysing the stages of a value chain, managers have been able to redesign their internal and external processes to improve efficiency and effectiveness.

The value chain model also treats information as a supporting element in the value-adding process, not as a source of value in itself. Managers often use information that they capture on inventory, production, or logistics to help monitor or control those processes, for instance, but they rarely use information itself to create new value for the customer. Lendeghem and Vanmaele (2002) have identified three hierarchical levels of value chain: operational, tactical and strategic. Following Islam (1997), the generic value chain model developed for the Australian Seafood industry (ASI) is of tactical and strategic type and based on the concept of regional economic modelling framework. It is developed in computer spreadsheets as an accounting tool and structured to illustrate the product and financial flows which occur throughout the ASI. It provides an overview of the industry and the linkages between the industry and other parts of the economy. The value chain model also specifies product-related information for each sector of the industry including fishing, wholesalers, retailers and exporters. The type of product-related information includes:

- the stage of product conversion or transformation;
- the nature and quantity of products (i.e. raw materials) brought forward from previous stages of processing;
- materials and services brought into the chain from outside the industry; and
- the nature and quantity of products which progress to the next stage of processing, or to consumers.

Each physical input or output of an industry is linked directly to price. In this way the model also specifies financial information for each sector in the industry, including:

- the value of products brought forward from previous processing stages;
- the cost of materials and services purchased from outside the chain;
- income accrued at each stage from sales of products;
- transport, storage and handling costs incurred in moving products between processing stages; and
- the difference between total income earned and the total cost of inputs purchased, which in economic terms is value added.

By describing these linkages the model can show the contribution of each sector such as production, processing and marketing to the relevant economies.

The primary application of this value chain modelling is to estimate value added components and quantify the relative contribution of the industry to economy. The model could identify constraints to, and potential for value adding, from research and development and from tactical and strategic policy implementations. The steps and methods of developing a generic value chain model for the seafood industry is described next.

3.0 Seafood industry value chain model

3.1 Definition of terms used

There are a number of terminologies used in this study. Understanding their definitions at the outset would be helpful for interpretation of the results in terms of value chain performances of the seafood industry.

Seafood: refers to the types of fish caught and fish products processed in Australia.

Seafood industry: refers to include both fish harvesting and post harvesting sectors such as transportation, auction, processing & wholesale, retail and export which are linked in terms of buying and selling of fish and fishery products flowing from harvest to markets.

Seafood industry value chain: refers to the values generated by the seafood industry supply chain i.e. seafood and non-seafood sectors, through which fish and fish products move to the final markets for consumption and exports. The non-Seafood sectors include transport, auction, processing, retail and export which are linked to the harvesting sector in terms of the flow of goods and services.

Value added: measures the value of seafood or industry's direct contribution to the economy. It is the sum of profits, wages, rents and interest. In other words, according to the national income accounting terms this measure is equivalent to gross domestic product (GDP).

Gross Value: is total value of outputs or gross income. It is also measured as the sum of the value added and the costs of purchased and intermediate inputs.

Landing value: is the value of seafood at the point of catch. It equals to the product of harvesting level price and quantity of fish harvested.

Harvesting value added: is the difference between the landing value and purchased inputs used for seafood harvesting. It indicates the Seafood harvesting sector's direct contribution to the economy.

Post-harvest value added: is the sum of the value added measured for all the sectors but harvesting through which the fishery products reach to the point of final sale. This constitutes the flow-on value of fishery products to the economy.

Value at the point of final sale: measures the gross value of the industry when the products are sold for final use/consumption. It includes value added as well as the cost of purchased inputs throughout the supply chain. In other words, it is the difference between the sum of all sectors' gross value and the sum of the intermediate goods.

3.2 The generic seafood industry model

In order to develop a generic seafood industry value chain model the first step is to identify the value adding sectors of the Australian Seafood Industry (ASI). A general guide to value chain modelling could be found in Islam (2003). In its simplistic form the basic structure of the ASI could be conceptualised to have six broad value adding sectors where fish and fish products flow from fish-harvest to exports and retail sectors through transportation, auctions, wholesale & processing (see Figure A1 in Appendix A).

Based on an intense analysis of different region's (Iceland, Tanzania, Morocco and Denmark) seafood industry literature (Gudmundsson, Asche and Nielson 2006), consultation with industry experts and gathering relevant information and data, the number of sectors and sub-sectors of the industry were identified to represent the value adding stages of fish and fish products flow from harvesting, transport/auction and through processing to retailing and exports. The five major sectors and their corresponding sub-sectors are identified in Table 1. The number of sub-sectors however may vary depending on the geo-physical and economic circumstances of a specific company.

Based on the identified sectors and sub-sectors in Table 1 the basic structure of the ASI (given in Figure A1) is expanded and restructured to develop a generic value chain model for the ASI as presented in Figure 1.

Table 1. The seafood industry structure

No.	Industry sectors	Sub sectors
1	Fish Harvest	Trawl catch Trap catch Line Catch Purse Seine Hand Gathering
2	Transport/Auction	Transporter/Auctioneer
3	Processing/Wholesale	Processing centre type 1 (for Supermarkets & Food services) Processing centre type 2 (for own retailing, supermarkets & Fish mongers) Processing centre type 3 (for retail vans, food services & contract processing)
4	Export	Interstate trade Export (international)
5	Retail	Supermarkets Food service (restaurants, catering etc) Fish mongers Retail vans Processor's retail outlets

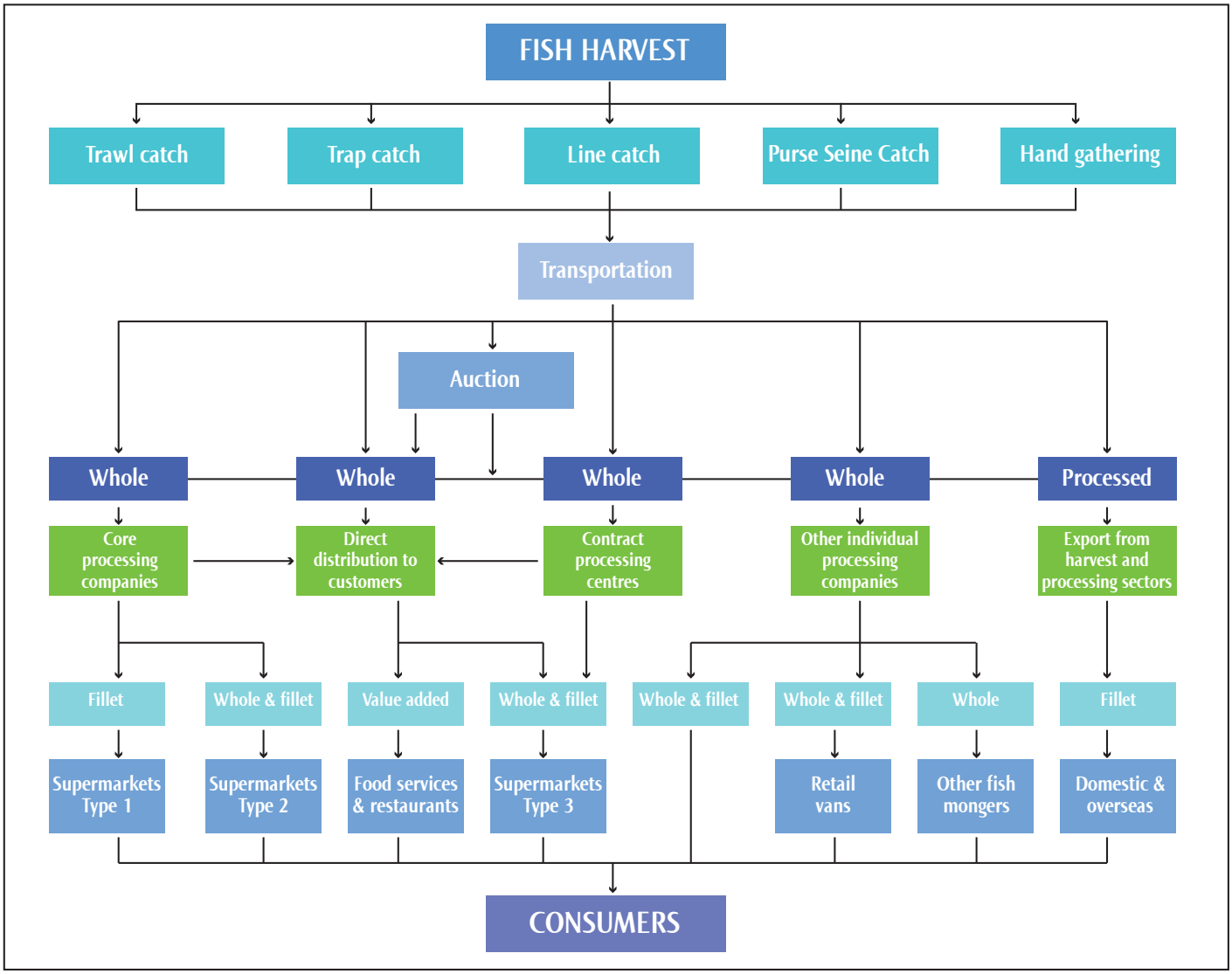
As mentioned above, personal communications and individual discussions with different key authorities and industry stakeholders were involved in acquiring seafood specific information to identify the links of the sectors and the flow of products within the industry. Other required data and relevant information were drawn from the Department of Fisheries Annual reports (Fletcher and Santoro, 2009) and from the Department of Agriculture and Food WA reports (Xayavong et al., 2009). Figure 1 shows the links among the sectors and sub-sectors of the ASI and their products flow from harvest to consumers.

There are five fish catching methods practiced in the ASI. The boxes in the second row from the top of Figure 1 show these methods (Trawl, Trap, Line, Purse Seine and Hand Gathering) for catching different types of fish and they are considered as sub-sectors of the 'Fish Harvest' sector. The fish and fish products from this sector are transported to different processing centres or to the exporters directly and in some cases through the auction centres. The direction arrows in the next four rows indicate the flows. The fifth and seventh rows of the boxes represent the type of products flow along the chains. The second last row of the boxes stands for the Retailing sectors that sell fish and fish products to the consumers directly and for export markets.

The generic model structure presented in Figure 1 however will vary in its composition of sectors and sub-sectors in the real application of the model for a specific company. For example, the sectors and sub sectors within a company may not be very clearly defined in the sense that some companies may have their own transportation and others may use sub-contracted transportation; some may have auctions at the landing level and others may have auctions after transportation. Some of the fishing companies do their own processing on boat for export purposes. These variations do not affect the accuracy of the value chain modelling as long as the inputs and outputs associated with each sector are properly determined in order to identify the value adding steps in the chain. Hence, the value adding estimation and its accuracy depends on how effectively the input and output costs are identified and calculated. This issue is explained in the model application stage.

3.2 The generic seafood industry model (contd.)

Figure 1. The generic value chain model for Australian Seafood Industry



3.2 The generic seafood industry model (contd.)

After the identification of the sectors, sub sectors, their linkages, and the flow of products within the chain, the value adding calculations is conducted. Such calculations are made by developing a structured accounting table in an Excel spreadsheet for each identified sectors and sub-sectors. (see Islam, 1997; 2003; Islam and Campbell 1999; and Islam and Xayavong 2010). An overview of the accounting table that makes up a value added spreadsheet structure is presented in Figure 2. Each accounting table is composed of six sections.

'Section I' includes the types and quantities of either primary products produced/harvested or the prices and quantities of the types of intermediate goods purchased from the previous stages (sectors/sub-sectors) of the industry/company. For the fish harvest sector, 'Section I' of the table only includes types and quantity of fish caught by different catch methods. For the other sectors such as, auction, processing, retail and export 'Section I' of the table includes the type and quantity of intermediate products bought from previous stages of production from within the industry.

'Section II' (inputs from external sources) includes the quantity and price of inputs used from outside the companies to produce or process fin-fish in 'Section I'. These include purchased inputs (such as materials and services), wages, salaries, services, taxes, rents and interests.

'Section I' is linked with 'Section II' by the flow of quantity of fish and fish-products or the intermediate fish purchased from previous sectors.

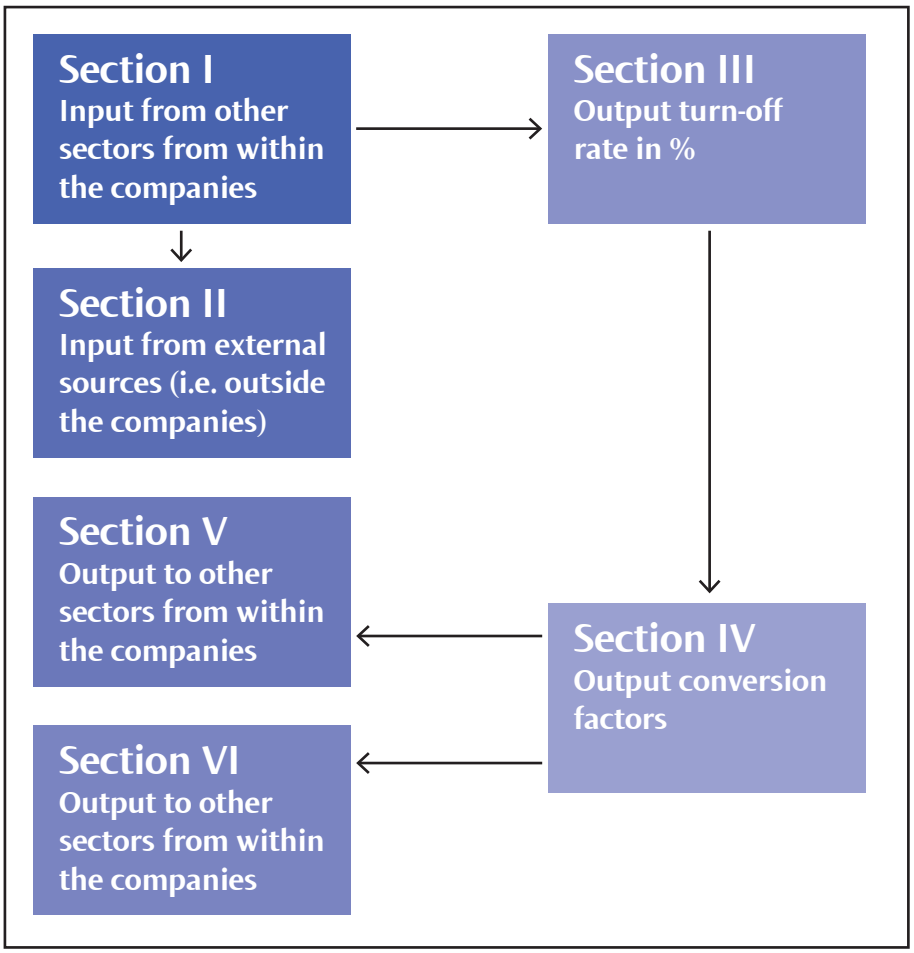
'Section III' includes the turn-off percentage and the proportion of the primary or the intermediate products listed in 'Section I', which is converted/ processed into different types of intermediate and final products.

'Section IV' includes output conversion factors, which includes technical information about the intermediate inputs listed in 'Section I' to produce products listed in 'Section V' and 'Section VI'. For example, the quantity of fish fillets produced from a tonne of whole fish.

'Section V' (output to other sectors) includes quantities and prices of intermediate products produced in this section.

'Section VI' includes quantities and prices of products, listed in 'Section I' and go out of the industry as final products.

Figure 2. The structure of a value-added spreadsheet (adapted from Islam, 2003).



3.2 The generic seafood industry model (contd.)

The intermediate goods/products produced in 'Section V' of a sector flows to 'Section I' of the subsequent sectors of the companies as raw inputs. Therefore, 'Section V' of the previous sector established links with 'Section I' of subsequent sectors.

To estimate the industry's valued added, it is necessary to estimate the transaction values within the 'sectors within-industry' and the transaction values between the 'sectors within-industry' and the 'sectors outside-industry'. The transaction values are captured by the following equations (extracted from Islam and Xayavong, 2010):

Total production cost equation for each sector within-industry (TCs)

$$TC_s = \sum_{r=1}^{R} P_{sr} Q_{sr} + \sum_{x=1}^{X} C_{sx} \bar{Q}_{sr} + w_s \bar{Q}_{srn} + k_s \bar{Q}_{sr} + v_s \bar{Q}_{sr} \qquad (1)$$

Where,

$\bar{Q}_{sr} = \sum_{r=1}^{R} Q_{sr}$

Q_{sr} is the quantity of raw intermediate goods purchased from sectors within industry;

P_{sr} is the purchase prices of Q_{sr};

C_{sx} is the cost of x^{th} purchased inputs per unit of $\bar{Q}_{sr}$ processed; and

w_s k_s v_s respectively are wage, rents and interest paid per unit of processed. per unit of $\bar{Q}_{sr}$ processed.

The first argument in the RHS of equation (1) is the cost of raw intermediate goods Q_{sr} purchased from sectors within-industry; the second argument is the cost of purchased inputs x from sectors outside-industry; the third, fourth and fifth arguments are respectively total wage, rent and interests paid in processing total quantity of raw intermediate goods.

Product transformation equation

In each sector, the raw intermediate goods Q_{sr}, either individually or in combination processed, are used to produce transformed intermediate Q_{si} and/or final Q_{sf}. Therefore, the product transformation equation can be expressed as follows:

$$Q_{si} \,\&\, Q_{sf} = \phi \sum_{r=1}^{R} \alpha_{sr} Q_{sr} \qquad (2)$$

Where,

ϕ is the product transformation factor (e.g. amount of milk needed to produce 1kg butter);

α_{sr} is the proportion of Q_{sr}; and

$\sum_{r=1}^{R} \alpha_{sr} Q_{sr}$ is therefore the total amount of Q_{sr} used to produce intermediate Q_{si} and/or final Q_{sf}.

3.2 The generic seafood industry model (contd.)

Total revenue equation for each sector within-industry (TRs)

$$TR_s = \sum_{i=1}^{I} P_{si} Q_{si} + \sum_{f=1}^{F} P_{sf} Q_{sf} \qquad (3)$$

Q_{si}	is the sale quantity of intermediate goods;
Q_{sf}	is the sale quantity of final goods;
P_{si}	is the prices of intermediate goods produced by sectors;
P_{sf}	is the prices of final goods produced by sectors.

The first argument in the RHS of equation (3) is the value of the revenue generated from the sale of intermediate goods to other sectors within industry (estimated in OPWI table); the second argument is the revenue received from the sale of final goods to sectors outside-industry.

Finally, the industry's value added can be derived using equations (1) and (3) as follows:

Total revenue equation for each sector within-industry (TRs)

$$TVA = \sum_{s=1}^{S} TVA_s \qquad (4)$$

Where, $$TVA_s = TR_s - TC_s + w_s Q_{sr} + k_s Q_{sr} + v_s Q_{sr}$$

4.0 Application of the generic model

With an aim of developing and understanding the applicability of the generic value chain model structured in Figure 1 to quantify the impacts of interventions on the industries economic performance on a trial basis, three fin-fish companies operating in Western Australia (WA) were selected. The selection was based on the willingness of the companies to participate on a voluntary basis. The three fin-fish companies' real names however could not be revealed because of an agreement with the project researchers to maintain strict data and business confidentiality. For that matter, the three companies are identified in this report as, "Company 1", "Company 2" and "Company 3".

The additional reason for choosing these companies was because they were found to be cooperative and operating in WA. However, despite their full willingness to cooperate access to their relevant data remained to some extent limited which is again because of their strict confidentiality policy. Despite this limitation and given the project time line and limited budget, these companies were considered to be the best options to try the applicability of the generic model and to gain an understanding of the contribution of fin-fish industries to the WA economy.

Being guided by the structure of the generic model in Figure 1 the value adding sectors and sub-sectors specific to the fin-fish companies were identified first. Then the linkages of these sectors and sub-sectors were established through consultation with the respective fin-fish stakeholders to determine their product flows. Also, for each of these company sectors, input and output items were identified and their quantities and prices were collected through a series of consultations. Usually prices and quantity data are available for primary production/harvest levels and for retail and export levels. But for the intermediate levels such as transport, auction and processing, they are not readily available. In such cases both forward and back calculation methods were applied following Islam (1997, p.6) in order to estimate the components of transaction values (as specified in equations 1, 2 and 3 above) for each sector. The forward calculations were made by beginning the harvest level data collected from the company officials and reports and the back calculations were made by beginning with the collection of the relevant data from visiting the retailing stores and searching exports statistics. Care was taken to avoid double counting while applying both the methods for estimating transaction values for an intermediate sector.

Finally the value chain models for each of the companies were developed separately and presented in Figures B1.1, B2.1 and B3.1 in Appendix B for companies 1, 2, and 3 respectively. The data sources and more specific measurement steps are explained next.

4.1 Data source and key assumptions

As specified in equations above, in order to apply the generic model for a specific company or a region or a state, specific data on prices and quantities of inputs used, and outputs or products produced in each sectors in the model and the share of the flow of products moving from harvest to consumers are required. Therefore, to develop specific value chain models for 'Company 1, Company 2 and Company 3' relevant data were sourced from consultation with company representatives as well as with representatives from various sectors of the fin-fish industry, officials from the Department of Fisheries, by referencing reports and market information from a variety of sources, and also by visiting various fish retailing and processing centres.

Major data sources are:

- Department of Fisheries Western Australia - Annual report (Department of Fisheries Western Australia, 2009).
- Department of Resources – Fisheries, Northern Territory, Annual Report (DRFNT, 2009).
- Australian Industry Report – Fin-fish Trawling in Australia, (IBISWorld 2009).
- Personal interviews with a limited number of wholesalers and retailers and these interviews involved going over figures on inputs and outputs of the business including costs and income associated with the business used in the model.

The specific information gathered for each sectors includes:

Inputs

- Prices and quantities of inputs from sectors within the companies (see Section I in Figure 2).
- Prices and quantities of purchased inputs from sources external to the industry (see Section II in Figure 2).

Outputs

- Value and quantity of outputs to sectors within the industry (see Section V in Figure 2).
- Value and quantity of outputs to destinations external to the industry (see Section VI in Figure 2).

Key assumptions

As mentioned above, there is a general lack of availability of required data on average production, costs and returns. In some instances commercial confidentiality concerns made it difficult to get real figures. Hence, the figures presented in this report are measured using the following steps. First, using both the forward and back calculation methods some ballpark figures were estimated based on an amalgam of data gathered from various sources as mentioned above. These ballpark figures were then subjected to scrutiny by industry experts to refine the estimates.

The types of fin-fish caught by the companies are listed in Appendix Tables B1.2, B2.2 and B3.2 respectively. For Company 2, there were big lists of the types of fish caught with a very little information on the shares of each. The total tonnage of catch has been found to be grouped as "other demersal catch". Through consultation with the company personnel the quantity shares of major categories of fin-fish were estimated. In the absence of 'on the boat' price information for each category of fish an weighted average price of per tonne fin-fish for Company 1 and Company 2 was estimated to be $2,096 per tonne (irrespective of fish type) by taking industry experts' opinion. For Company 3, the average price estimation is more accurate as the company only catches one type of fish and the price was calculated to be $400 per tonne. In the next section summary results from the application of the generic model on three specific fin-fish companies are presented.

5.0 Results and discussions

While details of the model results from the application of the generic model for each of the three companies are given in Appendix B, in this section the major findings on three fin-fish companies of WA are summarised and discussed briefly. The results provide an indication about the contribution of these companies to the WA economy. The results could also be used as a proxy and/or to get some idea about the value adding potentials and contributions of the WA as well as the national seafood industries to the respective economies. The value adding calculations for each of the companies were conducted separately to identify their individual sector-wise contributions and presented in Appendix B. As mentioned earlier company names are kept anonymous due to their business and data confidentiality.

5.1 Major findings

The summary results for all the three selected companies from their value chain models are shown in Table 2 and for each company specific results are presented in Table 3. The sectors of the fin-fish companies are grouped into three major categories to provide an easy comparison of the relative performance of these companies. All the fish-harvesting sub-sectors including transport are grouped as harvest and the auction, wholesale and processing sectors are grouped as wholesale/processing. The exports and retail sectors are grouped as retailing. The sectors like auction and export however are not common for all the three companies.

Table 2. Western Australian fin-fish company value chain summary, 2009/10

	All Companies			
	Harvest	Wholesale/ Processing	Retailing	Total
	(1)	(2)	(3)	(4)
1. Input from sectors within industry ($m)	5.71	23.65	10.81	40.16
2. Input from sectors outside industry ($m)	8.93	5.12	2.78	16.83
3. Total Input ($m)	**14.64**	**28.76**	**13.59**	**56.99**
4. Output to sectors within industry ($m)	17.62	22.56	0.00	40.18
5. Output to sectors outside industry ($m)	0.03	10.92	16.46	27.41
6. Total Output ($m)	**17.66**	**33.48**	**16.46**	**67.59**
7. Profit ($m)	3.02	4.71	2.87	10.60
8. Wages ($m)	2.45	1.87	0.91	5.23
9. Interests ($m)	0.25	0.49	0.48	1.22
10. Rents ($m)	0.21	0.44	0.24	0.89
11. Value Added ($m)	**5.93**	**7.51**	**4.50**	**17.94**
12. Value Added share (%)	**33**	**42**	**25**	**100**
13. Profit (% of Total Output)	17	14	17	16
14. Wages (% of Total Output)	14	6	6	8
15. Interests (% of Total Output)	1	1	3	2
16. Rents (% of Total Output)	1	1	1	1

5.1 Major findings (contd.)

The total value added component generated by these companies is estimated at $17.94 million which includes $10.60 million of profits and over $5.23 million in wages and salaries within fin-fish industry (see Column 4 of Table 2). If we consider these three companies are representative of the whole WA fin-fish industries then analysis of the figures in rows 12 to 16 would provide a broad picture about the value chain contributions of the fin-fish industry in WA. Among the three broad sectors, wholesale/processing sector is the major contributors to the economy where more than 40 per cent of the value adding is generated (see row 12 and column 2 of Table 2. However in terms of wage payments the harvest sector makes the largest payment of $2.45 million (row 8, column 1) and comprises of more than 14 per cent total output of the fin-fish industry. Surprisingly, the harvest sector appeared to be the most labour intensive compared to the other two sectors.

Figures in row 5 give the values at the point of final sale (Table 2). The total value of $27.41 (row 5, column 4) at the point of final sale indicates the value when the fish and fish products of all the three companies reach the final buyers. In other words these three fish companies combined generate more than $27 million worth of economic activities in WA.

A summary comparison of the value chain results for the three selected companies is done in Table 3. In terms of the size of the total output values for harvest and wholesale/processing sectors between Company 1 and Company 2 they are more or less the same. However, the retailing sector's output value for Company 2 is almost twice as much as of Company 1 and four time as much as of Company 3. Characteristically Company 3 is significantly different in terms of its smallest size, only one type specialised fish harvested and supplied only to domestic markets. A detail comparison of the value chain model structures of these three companies can be made by examining the Figures B1.1, B2.1 and B3.1 in Appendix B.

Table 3 shows that in a typical year the value added contribution of Company 1 is about $7.04 million (row 11, column 4). The value added contribution of Company 2 is slightly higher and estimated at $8.74 million (row 11, column 8). On the other hand, for Company 3, the total value adding is the lowest at $2.17 million only. It is interesting to note that for Company 3, although its profit at harvest level is only 10 per cent of the total output but it has the largest percentage (27 per cent) of output paid as labour wage. This high wage-output ration may indicate that a greater number of small scale specialised seafood companies can generate more employment.

For all the companies a sector-wise value added distribution is illustrated in Figure 3 in an elaborate way. Panel A shows, for all 3 companies export (less than 0.5 per cent) is very unremarkable, and together the retailing (32 per cent) and harvesting (33 per cent) sectors are adding more value than the other sectors. From panel B, C and D it is found that among the three companies, Company 1 and Company 2 has the largest value adding sectors which are harvesting and wholesale/ processing sectors. But for Company 3 the most value adding sector is retailing (75 per cent).

The harvesting (8 per cent) and wholesale (17 per cent) sectors of Company 3 (Panel D) are making very little value adding in comparison to retailing (75 per cent). This company has no export sector. Panel B (Company 1) shows that the company's most value adding sector is wholesale/ processing as they do not have any auction in the middle. So the processing companies are getting more value adding scopes. Although in panel B and C the harvesting sector has similar value adding for the companies but the processors of panel C are less capable to add value than the company presented in panel B. As this section provides the sector-wise comparisons of the companies' contributions to WA economy which was identified from the respective value chain models, the next section articulates further clarifications on the use of the models and any limitations to make that more applicable.

5.1 Major findings (contd.)

Table 3. Value chain summary of the three selected Fin-fish companies in Western Australian, 2009/10

	Company 1				Company 2				Company 3			
	Harvest	Wholesale/ Processing	Retailing	Total	Harvest	Wholesale/ Processing	Retailing	Total	Harvest	Wholesale/ Processing	Retailing	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Input from sectors within industry ($m)	2.31	11.20	0.48	13.99	3.40	11.99	9.12	24.50	0.00	0.46	1.21	1.67
2. Input from sectors outside industry ($m)	4.38	2.82	0.07	7.28	4.13	1.65	1.39	7.17	0.41	0.65	1.32	2.38
3. Total Input ($)	**6.69**	**14.03**	**0.55**	**21.27**	**7.53**	**13.64**	**10.50**	**31.67**	**0.41**	**1.10**	**2.54**	**4.05**
4. Output to sectors within industry ($m)	8.19	5.77	0.00	13.96	8.98	15.58	0.00	24.55	0.46	1.21	0.00	1.67
5. Output to sectors outside industry ($m)	0.03	10.54	0.65	11.22	0.00	0.39	12.58	12.96	0.00	0.00	3.23	3.23
6. Total Output ($)	**8.22**	**16.30**	**0.65**	**25.18**	**8.98**	**15.96**	**12.58**	**37.52**	**0.46**	**1.21**	**3.23**	**4.90**
7. Profit ($m)	1.53	2.28	0.10	3.90	1.45	2.32	2.07	5.84	0.05	0.11	0.69	0.85
8. Wages ($m)	1.09	1.08	0.03	2.19	1.24	0.60	0.35	2.19	0.12	0.19	0.53	0.85
9. Interests ($m)	0.09	0.37	0.01	0.47	0.16	0.08	0.27	0.52	0.00	0.03	0.20	0.23
10. Rents ($m)	0.09	0.37	0.01	0.47	0.11	0.04	0.03	0.18	0.01	0.03	0.20	0.24
11. Value Added ($m)	**2.79**	**4.09**	**0.15**	**7.04**	**2.95**	**3.05**	**2.74**	**8.74**	**0.18**	**0.37**	**1.62**	**2.17**
12. Value Added share (%)	**40**	**58**	**2**	**100**	**34**	**35**	**31**	**100**	**8**	**17**	**75**	**100**
13. Profit (% of Total Output)	19	14	15	16	16	15	16	16	10	9	21	17
14. Wages (% of Total Output)	13	7	5	9	14	4	3	6	27	16	16	17
15. Interests (% of Total Output)	1	2	2	2	2	1	2	1	1	3	6	5
16. Rents (% of Total Output)	1	2	2	2	1	0.3	0.3	0.5	2	3	6	5

5.2 Use of model and limitations

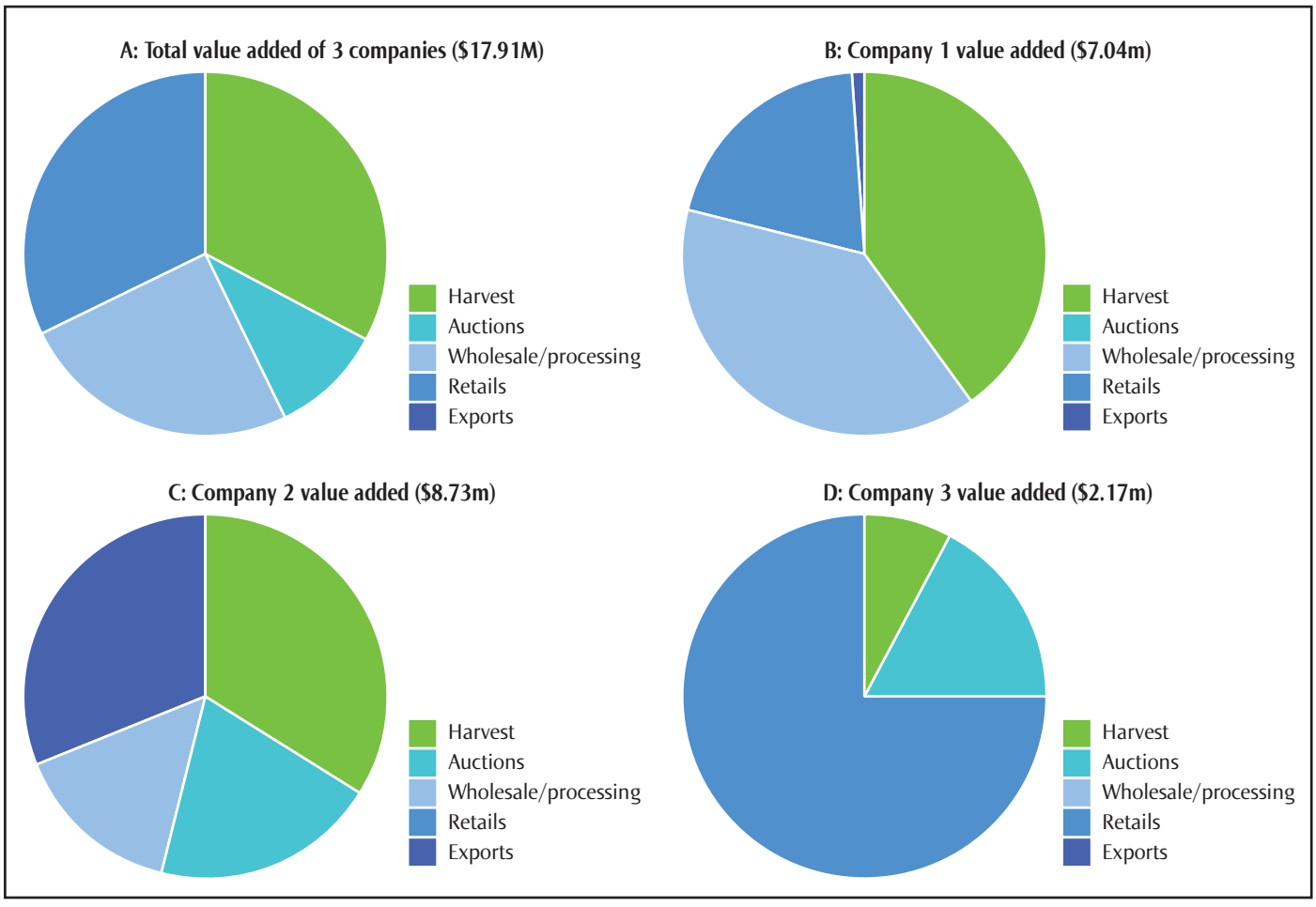
While the above analysis provides an understanding of the company specific contributions in terms of sector-wise value adding, the value of estimation depends on production, processing, output price, input costs and domestic and export market conditions. In such conditions to conduct value chain analysis each of the three value chain models presented in B1.1, B2.1 & B3.1 (Appendix B) can be utilised in two ways. Firstly, because the value chain models provide an overview of all activities and products within the companies, it can be used as a physical and financial description of the companies. Each model is descriptive and can serve as a reference source. Secondly, the models can be used as a research and decision support tool for simulation of a number of possible scenarios. It can analyse the impacts on industry changes due to events external to the industry, such as inputs and product prices, technologies, tariffs and exchange rates.

The value chain spreadsheet model is a simple, transparent and very powerful analytical tool which can provide key information to support a number of management and strategic planning decisions. An industry program can use this model to monitor and evaluate industry performance on a regular basis. The results from the trial application of the generic model indicates that any individual Seafood company can use the model to analyse their value adding performances and understand their weaknesses and strengths in economic routines to become competitive in the market. Similarly, the model is also applicable on the whole of the Australian Seafood Industry to identify weaknesses of the value added sectors and impacts of external changes to the chains for recognising measures of any such vulnerabilities thereby deriving increased value adding from the industry to the economy through the commissioning of reasonable and specific R&D programs.

As mentioned earlier, there are few limitations of this study caused by limited data availability and strict data confidentiality for value-added calculations of the fin-fish companies. However, the results presented are assumed to be realistic but not perfect as many variables and data were not readily available. For example, the cost inputs and revenue of post-harvest sectors of the companies were difficult to get. Under this limitation the relevant statistics were estimated based on extrapolation of data from other similar studies or from expert opinions.

However, given the limitations the results of the models appear to provide reasonable estimates of the fin-fish companies contribution to WA economy in a typical year scenario. Given the flexibility and transparency characteristics of the model there remains scope for improvement of the models with the availability of more realistic data and to analyse the effects of changes in the economic circumstances on the fin-fish companies.

Figure 3. Sector-wise distribution of value added for WA fin-fish companies.



6.0 Concluding comments

A clear understanding of the contribution of the Australian Seafood Industry is very critical, as the industry is facing the challenge of remaining competitive in the face of cost-price pressure, exacerbated by the considerable distance from harvest to market and decreasing catch size. This study has developed a generic Seafood Industry value chain framework and applied on three fin-fish companies to provide an overview understanding of the fin-fish industry value adding components. The value chain models developed for these companies are believed to provide an understanding even for a small scale Seafood industry. These models have a flexible capacity to simulate any outcomes of a strategic policy options for the whole of the industry and evaluate alternative strategic options to deal with ongoing challenges. The understanding will be very helpful to the Fin-fish/Seafood Industry supply chain stakeholders for their strategic decision making by responding to the industry challenges for profitable and sustainable growth into the future.

This report attempted to provide the value chain modelling detail and its importance for understanding the economic performance of the Seafood Industry. The application of the generic model on three specific fin-fish companies is believed to be useful in identifying and gathering data for the Australian Seafood Industry and to analyse and understand the impacts of policy and technological interventions through the application of the model. Hence, completion of the generic model will be valuable asset and tool and its application will provide a clear understanding of the ASI in terms of its value chain status, the most value adding sectors, points of weaknesses and strengths along the supply chain, the industry growth and value adding potentials and overall competitiveness of the industry. As a decision support tool the model can effectively be applied for a number of scenario analysis for strategic and technological policy development.

7.0 References

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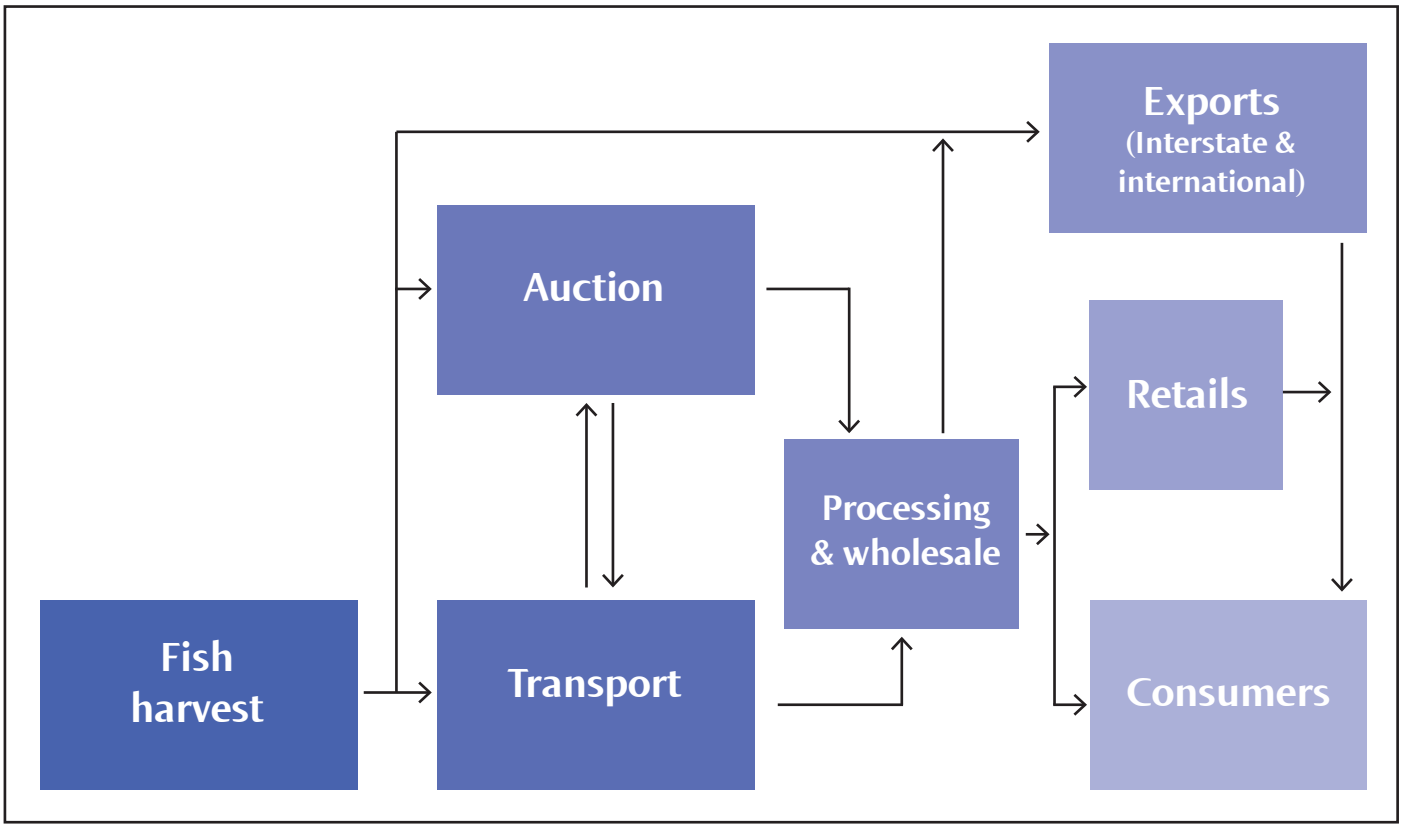
Appendicies

Appendix A

Figure A1. The basic structure of Australian Seafood industry value chain model



The conceptual value-chain model shows the product flow and linkages for sectors within the Seafood industry, as well as for external sectors that provide inputs to the industry. Each box in the above diagram is considered as a value adding sector of the seafood chains. This basic model is used to identify the detail sectors and sub-sectors for developing the generic value chain model for the Australia Seafood Industry (see Figure 1 in the text).

Appendix B - Company 1

Figure B1.1. Company 1 value chain model

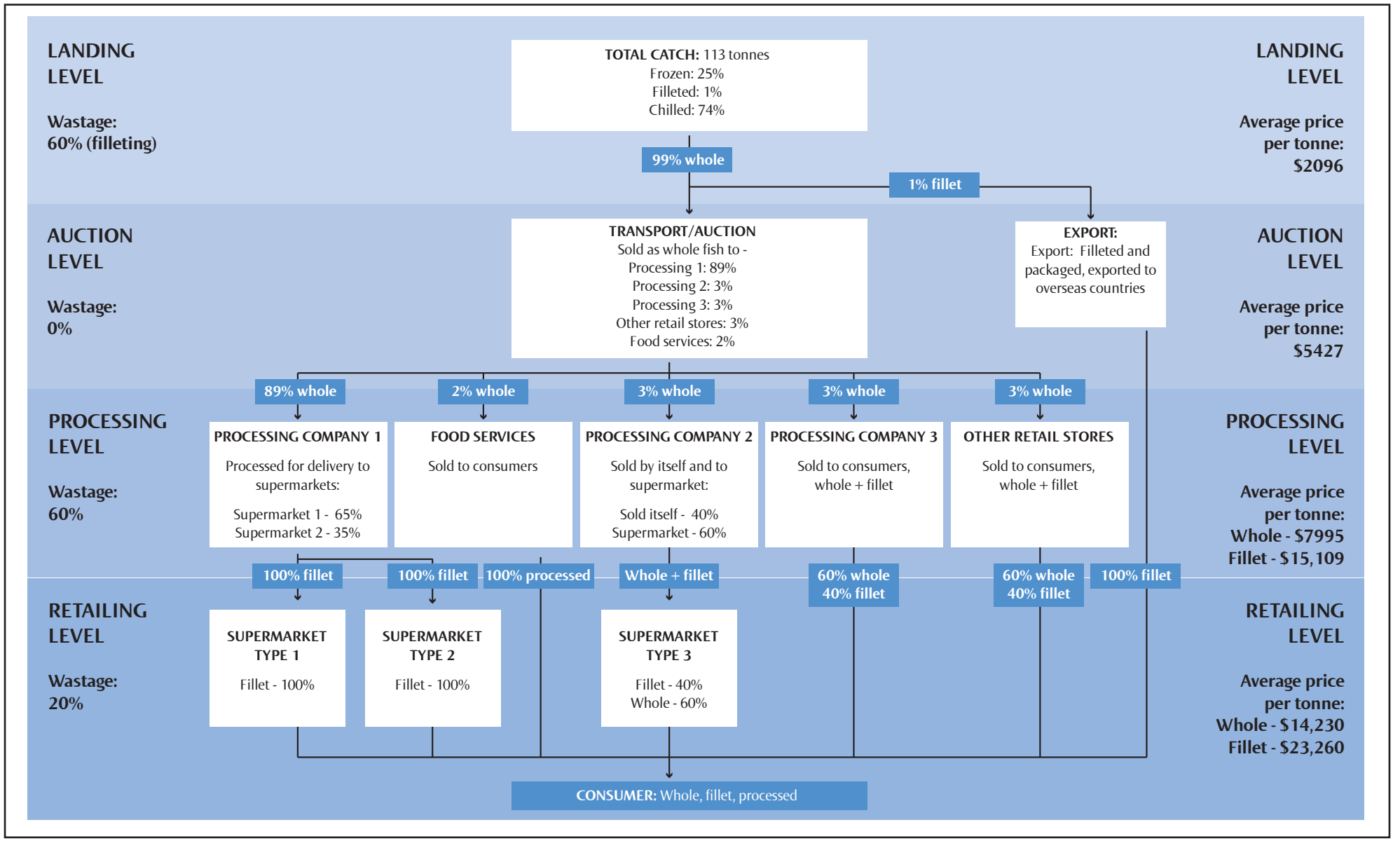


Table B1.1. Value chain model summary

	Fish Trawl	Transport	Processing Company 1	Processing Company 2	Processing company 3	Food services	Supermarket 1	Supermarket 2	Other Retail stores	Export	Total
Input from sectors within industry ($'000')	-	2,309	4,305	602	487	487	3,458	1,862	446	31	**13,989**
Input from sectors outside industry ($'000')	2,106	2,278	536	711	584	558	306	125	20	54	**7,282**
Total Input ($)	**2,106**	**4,587**	**4,841**	**1,313**	**1,071**	**1,045**	**3,764**	**1,987**	**466**	**85**	**21,271**
Output to sectors within industry ($'000')	2,309	5,884	5,320	446	-	-	-	-	-	-	**13,958**
Output to sectors outside industry ($'000')	3	-	-	1,174	1,291	1,275	4,429	2,366	542	106	**11,217**
Total Output ($'000')	**2,340**	**5,881**	**5,320**	**1,621**	**1,291**	**1,275**	**4,429**	**2,366**	**542**	**106**	**25,176**
Profit ($'000')	234	1,294	478	308	219	229	664	378	75	21	**3,904**
Wages ($'000')	631	455	160	284	233	223	122	50	8	21	**2,192**
Interests ($'000')	21	68	26	106	87	83	45	18	3	8	**470**
Rents ($'000')	21	68	26	106	87	83	45	18	3	8	**470**
Value Added ($'000')	**908**	**1,886**	**693**	**805**	**628**	**620**	**878**	**466**	**90**	**59**	**7,037**
Value Added in %	12.90	26.80	9.85	11.45	8.93	8.82	12.49	6.63	1.28	0.84	**100**
%Profit	10	22	9	19	17	18	15	16	14	20	
%Wages	27	8	3	18	18	18	3	2	1	20	
%Interests	1	1	1	7	7	7	1	1	1	8	
%Rents	1	1	1	7	7	7	1	1	1	8	

Table B1.2. Annual quantity and value of fish caught by trawl

Types	Quantity in tonnes	Landing price ($/t)	$ Value (in '000' $)
Saddletail Snapper	657	2,096	1,377
Crimson Snapper	45	2,096	94
Painted Sweetlip	141	2,096	296
Red Snapper	154	2,096	323
Gold band Snapper	45	2,096	94
Mangrove Jack	36	2,096	75
Redspot Emperor	35	2,096	73
Mixed Reef	0	2,096	-
Total	**1113**		**2,332**

Table B1.3. Cost of inputs from external sectors to fishermen

Cost items	Landing Cost ($/t)	Assumed Cost share (%)
Trawler cost	567.82	30
Packaging (plastic tubs)	189.27	10
Fishing gear and maintenance	189.27	10
Insurance	18.93	1
Licence and fees	18.93	1
On boat filleting and packaging	170.35	9
Ice cost	94.64	5
Auction charges	18.93	1
WAGES	567.82	30
INTEREST	18.93	1
RENTS	18.93	1
OVERHEADS	18.93	0
Total	**1,873.81**	**100**

Table B1.4. Transportation/auctioneer costs

Cost items	Cost ($/t)	% of total
Maintenance & repair	413.55	20
Fuel	620.32	30
Auction Charge	413.55	20
WAGES	413.55	20
INTEREST	62.03	5
RENTS	62.03	5
OVERHEADS	82.71	0
Total	**2067.73**	**100**

Table B1.5. Cost of fish inputs from other sectors to transport

Sectors	$ Value per tonne	
	Chilled	Frozen
Trawl catch	2096	2096

Table B1.6. Cost of inputs from external sources to exporter

Cost items	Cost ($/t)	% of total
Transport	1220	10
Tax	610	5
WAGES	4880	40
INTEREST	1830	15
RENTS	1830	30
OVERHEADS	1830	0
Total	**12,200**	**100**

Table B1.7. Cost of fish inputs from other sectors to exporter

Sectors	$ Value per tonne Filleted
Trawl catch	7000

Table B1.8. Cost of inputs from external sectors to processors

	Processing Company 1		Processing Company 2		Processing Company 3	
Cost Items	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**
Delivery	20.20	3	0	0	0	0
Interests	26.93	4	0	0	0	0
Energy	121.20	18	305.37	5	296.25	5
Overhead	67.33	10	0	0	0	0
Electricity	134.67	20	610.75	10	592.5	10
WAGES	202.00	30	2442.99	40	2370.02	40
INTEREST	33.67	5	916.12	15	888.76	15
RENTS	33.67	5	916.12	15	888.76	15
OVERHEADS	33.67	5	916.12	15	888.76	15
Total	**673.34**	**100**	**6107.46**	**100**	**5925.05**	**100**

Table B1.9. Cost of fish inputs from other sectors to processors

	Processing Company 1			Processing Company 2			Processing Company 3		
Sectors	**Filleted**	**Chilled whole**	**Frozen whole**	**Filleted**	**Chilled whole**	**Frozen whole**	**Filleted**	**Chilled whole**	**Frozen whole**
Transport/Auction	x	5427	5075	x	5427	5075	x	5427	5075

Table B1.10. Cost of inputs from external sectors to retailers

	Supermarket 1		Supermarket 2		Food Services		Other Retail Stores	
Cost Items	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**
Electricity	133.82	10	101.9	10	620.20	10	77.36	10
Energy	66.91	5	50.95	5	310.10	5	38.68	5
WAGES	535.26	40	407.6	40	2480.78	40	309.43	40
INTEREST	200.72	15	152.85	15	930.29	15	116.04	15
RENTS	200.72	15	152.85	15	930.29	15	116.04	15
OVERHEADS	200.72	15	152.85	15	930.29	15	116.04	15
Total	**1338.16**	**100**	**1019**	**100**	**6201.95**	**100**	**773.58**	**100**

Table B1.11. Cost of fish inputs from other sectors to retailers

	$ Value per tonne			
Sectors	**Filleted**	**Processed**	**Chilled whole**	**Frozen whole**
Supermarket 1				
Processing Company 1		15109		
Supermarket 2				
Processing Company 1		15109		
Food Services				
Transport/Auction/Processing Companies			5427	5075
Other Retail Stores				
Transport/Processing Company 2		17230		
Processing Company 2				
Transport/Auction			5427	5075
Processing Company 3				
Transport/Auction			5427	5075

Table B1.12. Fish flow from fishermen to other sectors within and outside the industry (%)

Sectors	Product type	Transport	Processing Company 1	Processing Company 2	Processing Company 3	Food Services	Super-market 1	Super-market 2	Other Retail Stores	Export	Consumers	Total	Wastage
Fish trawl	Chilled	74											
	Frozen	25											
	Filleted									0.4			0.6
	Total	**99**								**0.4**		**99.4**	**0.6**
Transport	Chilled+ frozen		50	20	15	15							0
	Total		**50**	**20**	**15**	**15**						**100**	**0**
Processing Company 1	Filleted						26	14					60
	Whole												
	Total						**26**	**14**				**40**	**60**
Processing Company 2	Whole										48		12
	Filleted										16		24
	Total										**64**	**64**	**36**
Processing Company 3	Whole								28		16		6
	Filleted								14		10		26
	Total								**42**		**26**	**68**	**32**
Food Services	Whole										48		12
	Filleted										16		24
	Total										**64**	**64**	**36**
Supermarket 1	Whole												
	Filleted										80		20
	Total										**80**	**80**	**20**
Supermarket 2	Whole												
	Filleted										80		20
	Total										**80**	**80**	**20**
Other Retail Stores	Whole												
	Filleted										80		20
	Total										**80**	**80**	**20**
Export	Filleted										100		
	total										**100**	**100**	**0**

Appendix B - Company 2

Figure B2.1: Company 2 value chain model

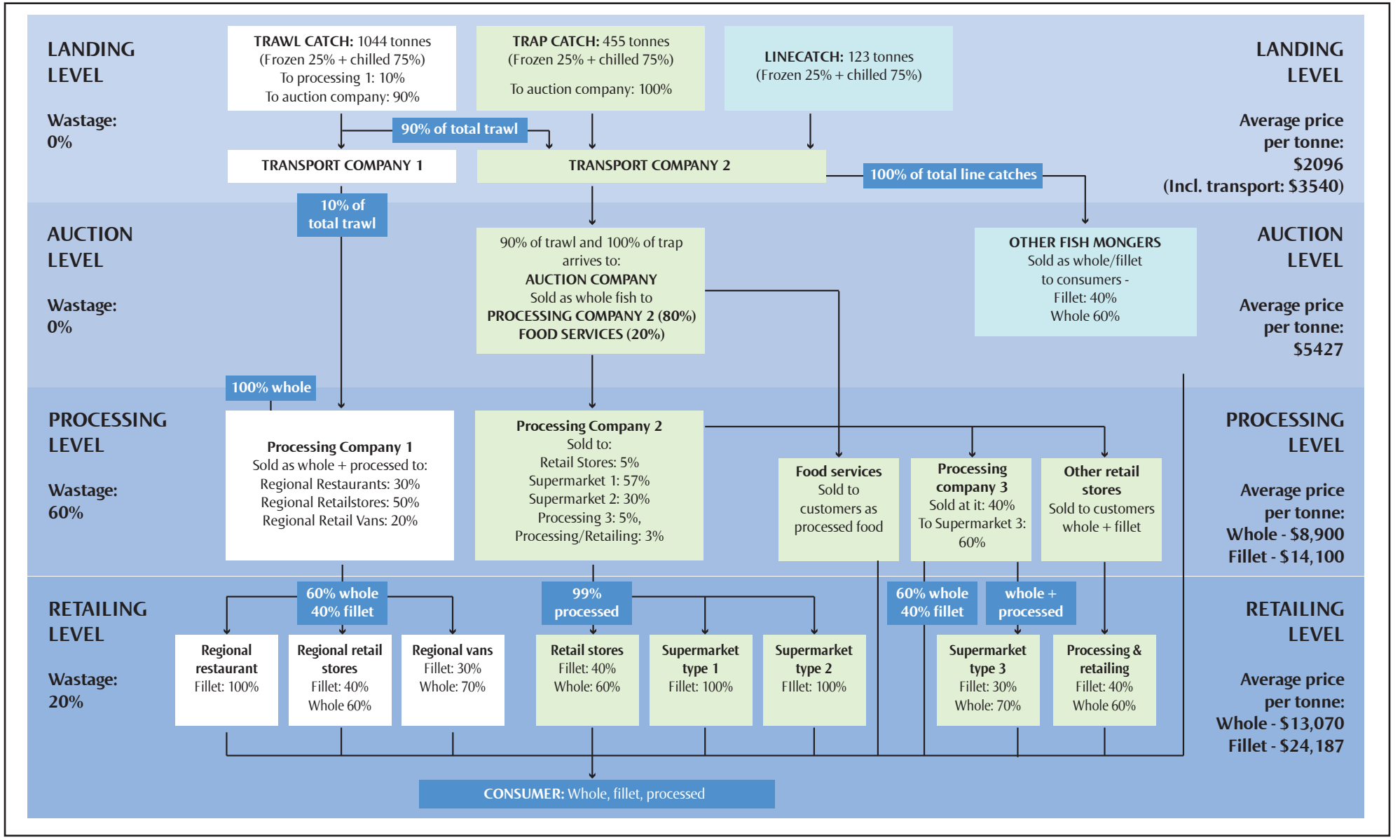


Table B2.1. Value chain model summary

	Trawl Catch	Trap catch	Line Catch	Transport Company 1	Transport Company 2	Processing Company 1	Processing Company 2	Processing Company 3	Auction Company
Input from sectors within industry ($'000')	-	-	-	656	2,743	874	6,435	528	4,150
Input from sectors outside industry ($'000')	1,969	839	224	174	926	405	248	63	934
Total Input ($)	**1,969**	**839**	**224**	**830**	**3,669**	**1,279**	**6,683**	**591**	**5,084**
Output to sectors within industry ($'000')	2,188	954	258	874	4,704	1,405	7,426	309	6,435
Output to sectors outside industry ($'000')	-	-	-	-	-	-	-	385	-
Total Output ($'000')	**2,188**	**954**	**258**	**874**	**4,704**	**1,405**	**7,426**	**695**	**6,435**
Profit ($'000')	219	114	34	44	1,035	126	743	104	1,351
Wages ($'000')	591	252	67	52	278	121	99	6	373
Interests ($'000')	20	59	16	17	46	10	25	25	23
Rents ($'000')	39	8	2	12	46	10	6	2	23
Value Added ($'000')	**869**	**433**	**119**	**125**	**1,405**	**268**	**873**	**137**	**1,772**
Value Added in %	9.94	4.96	1.36	1.43	16.08	3.07	9.99	1.57	20.28
%Profit	10	12	13	5	22	9	10	15	21
%Wages	27	26	26	6	6	9	1.34	1	6
%Interests	1	6	6	2	1	1	0	4	0
%Rents	2	1	1	1	1	1	0	0	0

Contd. below

	Regional Restaurants	Regional Retail Stores	Regional Retail Vans	Other Fish Mongers	Food Services	Super-markets 1	Super-markets 2	Super-markets 3	Other Retail Stores	Total
Input from sectors within industry ($'000')	263	861	280	553	434	3,995	2,103	309	316	24,504
Input from sectors outside industry ($'000')	125	76	59	463	25	398	172	25	39	7,167
Total Input ($)	**388**	**937**	**340**	**1,016**	**459**	**4,394**	**2,275**	**334**	**355**	**31,671**
Output to sectors within industry ($'000')	-	-	-	-	-	-	-	-	-	24,552
Output to sectors outside industry ($'000')	518	1,090	430	1,239	540	5,231	2,709	389	428	12,963
Total Output ($'000')	**518**	**1,090**	**430**	**1,239**	**540**	**5,231**	**2,709**	**389**	**428**	**37,516**
Profit ($'000')	129	152	90	223	81	837	433	54	72	5,844
Wages ($'000')	50	30	23	173	10	39	17	2	3	2,191
Interests ($'000')	3	1	1	11	2	159	69	10	15	8,036
Rents ($'000')	3	1	1	11	0	9	4	0	0	184
Value Added ($'000')	**185**	**187**	**117**	**420**	**94**	**1,046**	**524**	**67**	**93**	**8,737**
Value Added in %	2.13	2.14	1.34	4.81	1.08	11.97	6.00	0.78	1.07	100
%Profit	25	14	21	18	15	16	16	14	17	
%Wages	10	3	6	14	2	1	1	1	1	
%Interests	1	0	0	1	0	3	3	3	4	
%Rents	1	0	0	1	0	0	0	0	0	

Table B2.2. Annual quantity and value of fish catching by trawl, trap and line

	Trawl			Trap			Line		
Types	**Quantity in tonnes**	**Landing price ($/t)**	**$ Value (in '000' $)**	**Quantity in tonnes**	**Landing price ($/t)**	**$ Value (in '000' $)**	**Quantity in tonnes**	**Landing price ($/t)**	**$ Value (in '000' $)**
Blue spotted	111.35	2,096	233	48.53	2,096	102	13.12	2,096	27
Threadfin	107.49	2,096	225	46.85	2,096	98	12.66	2,096	27
Crimson	113.28	2,096	237	49.37	2,096	103	13.35	2,096	28
Brownstripe	53.42	2,096	112	23.28	2,096	49	6.29	2,096	13
Goldband	79.17	2,096	166	34.50	2,096	72	9.33	2,096	20
Red emperor	102.34	2,096	214	44.60	2,096	93	12.06	2,096	25
Saddletail	52.14	2,096	109	22.72	2,096	48	6.14	2,096	13
Spangled	18.02	2,096	38	7.85	2,096	16	2.12	2,096	4
Frypan snapper	23.82	2,096	50	10.38	2,096	22	2.81	2,096	6
Rankin cod	48.27	2,096	101	21.04	2,096	44	5.69	2,096	12
Other demersal	334.70	2,096	702	145.87	2,096	306	39.43	2,096	83
Total	**1044.00**		**2,187**	**455.00**		**953**	**123.00**		**258**

Table B2.3. Cost of inputs from external sectors to fishermen

	Trawl		Trap		Line	
Cost items	**Landing Cost ($/t)**	**Assumed Cost share (%)**	**Landing Cost ($/t)**	**Assumed Cost share (%)**	**Landing Cost ($/t)**	**Assumed Cost share (%)**
Trawler/Trap/Line cost	565.92	30	461.12	24	455.88	24
Fishing gear and maintenance	188.64	10	202.89	11	200.59	11
Insurance	188.64	10	184.45	10	182.35	10
Licence and fees	18.86	1	18.44	1	18.24	1
Rental and lease	37.73	2	18.44	1	18.24	1
Ice cost	18.86	1	92.22	5	91.18	5
Auction charges	18.86	1	18.44	1	18.24	1
Packaging (plastic tubs)	37.73	2	92.22	5	91.18	5
WAGES	565.92	30	553.34	29	547.06	29
INTEREST	18.86	1	129.11	7	127.65	7
RENTS	37.73	2	18.44	1	18.24	1
OVERHEADS	188.64	10	55.33	3	54.71	3
Total	**1886.40**	**100**	**1844.48**	**100**	**1823.52**	**100**

Table B2.4. Transportation costs (Companies 1 & 2)

	Transport company 1		Transport company 2	
Cost items	**Cost ($/t)**	**% of total**	**Cost ($/t)**	**% of total**
Maintenance & repair	55.45	10	70.73	10
Fuel	166.35	30	212.19	30
Auction Charge	55.45	10	70.73	10
WAGES	166.35	30	212.19	30
INTEREST	55.45	10	35.37	5
RENTS	38.82	7	35.37	5
OVERHEADS	16.64	3	70.73	10
Total	**554.50**	**100**	**707.30**	**100**

Table B2.5. Cost of fish inputs from other sectors to transport

Sectors	**$ Value per tonne**	
	Chilled	**Frozen**
Trawl catch	2096	2096
Trap catch	2096	2096
Line catch	2096	2096

Table B2.6. Cost of inputs from external sources to auctioneer

Cost items	**Cost ($/t)**	**% of total**
Delivery	118.10	15
Auction charges	157.47	20
WAGES	314.93	40
INTEREST	19.68	2.5
RENTS	19.68	2.5
OVERHEADS	157.47	20
Total	**787.33**	**100**

Table B2.7. Cost of fish inputs from other sectors to auctioneer

Sectors	**$ Value per tonne**	
	Chilled	**Frozen**
Transport company 2	3500	2380

Table B2.8. Cost of inputs from external sectors to processors

	Processing Company 1		Processing Company 2		Processing Company 3	
Cost Items	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**
Delivery	387.68	30	41.80	20	212.33	20
Energy	193.84	15	20.90	10	106.17	10
Electricity	129.23	10	31.35	15	159.25	15
WAGES	387.68	30	83.61	40	106.17	10
INTEREST	32.31	2.5	20.90	10	424.66	40
RENTS	32.31	2.5	5.23	2.5	26.54	2.5
OVERHEADS	129.23	10	5.23	2.5	26.54	2.5
Total	**1292.26**	**100**	**209.02**	**100**	**1061.66**	**100**

Table B2.9. Cost of fish inputs from other sectors to processors

	Processing company 1		Processing company 2	
Sectors	**Chilled whole**	**Frozen whole**	**Chilled whole**	**Frozen whole**
Transport company 1	2790	1945		
Auction company			5427	4260

Table B2.10. Cost of inputs from external sectors to retailers

	Regional Restaurants		Regional Retail Stores		Regional Retail Vans		Food Services		Supermarkets 1		Supermarkets 2		Supermarkets 3		Other Retail Stores		Other Fish Mongers	
Cost Items	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**
Fuel	0.00	0	0.00	0	232.83	20	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
Service/Delivery	667.60	20	97.67	20	116.41	10	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	753.12	20
Ingredients	333.80	10	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
Ice	0.00	0	48.84	10	174.62	15	123.92	20	294.73	20	242.72	20	223.93	20	220.75	20	376.56	10
Energy	500.70	15	73.25	15	0.00	0	61.96	10	147.37	10	121.36	10	111.97	10	110.38	10	564.84	15
Electricity	250.35	7.5	36.63	7.5	87.31	7.5	92.94	15	221.05	15	182.04	15	167.95	15	165.56	15	376.56	10
WAGES	1335.20	40	195.34	40	465.66	40	247.84	40	147.37	10	121.36	10	111.97	10	110.38	10	1412.10	37.5
INTEREST	83.45	2.5	12.21	2.5	29.10	2.5	61.96	10	589.47	40	485.44	40	447.86	40	441.50	40	94.14	2.5
RENTS	83.45	2.5	12.21	2.5	29.10	2.5	15.49	2.5	36.84	2.5	30.34	2.5	27.99	2.5	27.59	2.5	94.14	2.5
OVERHEADS	83.45	2.5	12.21	2.5	29.10	2.5	15.49	2.5	36.84	2.5	30.34	2.5	27.99	2.5	27.59	2.5	94.14	2.5
Total	**3338.00**	**100**	**488.35**	**100**	**1164.15**	**100**	**619.60**	**100**	**1473.66**	**100**	**1213.60**	**100**	**1119.65**	**100**	**1103.76**	**100**	**3765.60**	**100**

Table B2.11. Cost of fish inputs from other sectors to retailers

	$ Value per tonne			
Sectors	**Filleted**	**Processed**	**Chilled whole**	**Frozen whole**
Regional Restaurants				
Processing Company 1	7000			
Regional Retail Stores				
Processing Company 1		5500		
Regional Retail Vans				
Processing Company 1	7000		5200	
Food Services				
Processing Company 2	14100	9800		
Supermarkets 1				
Processing Company 2	14780			
Supermarkets 2				
Processing Company 2	14780			
Processing Company 3				
Processing Company 2			8900	5075
Supermarkets 3				
Processing Company 3	16230		13070	
Other Retail Stores				
Processing Company 2			8900	5075
Other Fish Mongers				
Transport Company 2			4500	2720

Table B2.12. Fish flow from fishermen to other sectors within and outside the industry (%)

Sectors	Product type	Transport company 1	Transport company 2	Processing Company 1	Auction company	Other fish mongers	Regional restaurants	Regional retail stores	Regional retail vans	Processing company 2	Food services	Super-markets 1	Super-markets 2	Processing company 3	Other retail stores	Super-markets 3	Con-sumers	Total	Wastage
Trawl catch	Chilled	6	56																
	Frozen	24	14																
	Total	**30**	**70**															**100**	**0**
Trap catch	Chilled		20																
	Frozen		80																
	Total		**100**															**100**	**0**
Line catch	Chilled		20																
	Frozen		80																
	Total		**100**															**100**	**0**
Transport company 1	Chilled/frozen			100															
	Total			**100**														**100**	**0**
Transport company 2 (trap catch)	Chilled/frozen				100														
	Total				**100**													**100**	**0**
Transport company 2 (line catch)	Chilled/frozen					100													
	Total					**100**												**100**	**0**
Processing company 1	Filleted						12	8	2.4										
	Whole							30	14										
	Total						**12**	**38**	**16.4**									**66.4**	**33.6**
Auction company	Filleted									100									
	Whole																		
	Total									**100**								**100**	**0**
Processing company 2	Filleted										8	8	8						
	Whole													20	20				
	Total										**8**	**8**	**8**	**20**	**20**			**64**	**36**
Processing company 3	Filleted															8	20		42
	Whole															30			
	Total															**38**	**20**	**58**	**42**
Regional restaurants	Filleted																		
	Whole																80		**20**
	Total																**80**	**80**	**20**
Regional retail stores	Filleted																16		24
	Whole																60		
	Total																**76**	**76**	**24**
Regional retail vans	Filleted																24		6
	Whole																70		
	Total																**94**	**94**	**6**
Supermarkets 1	Filleted																80		20
	Whole																		
	Total																**80**	**80**	**20**
Supermarkets 2	Filleted																80		20
	Whole																		
	Total																**80**	**80**	**20**
Supermarkets 3	Filleted																32		8
	Whole																60		
	Total																**92**	**92**	**8**
Other retail stores	Filleted																32		8
	Whole																60		
	Total																**92**	**92**	**8**
Other fish mongers	Whole																80		20
	Total																**80**	**80**	**20**

Appendix B - Company 3

Figure B3.1: Company 3 value chain model

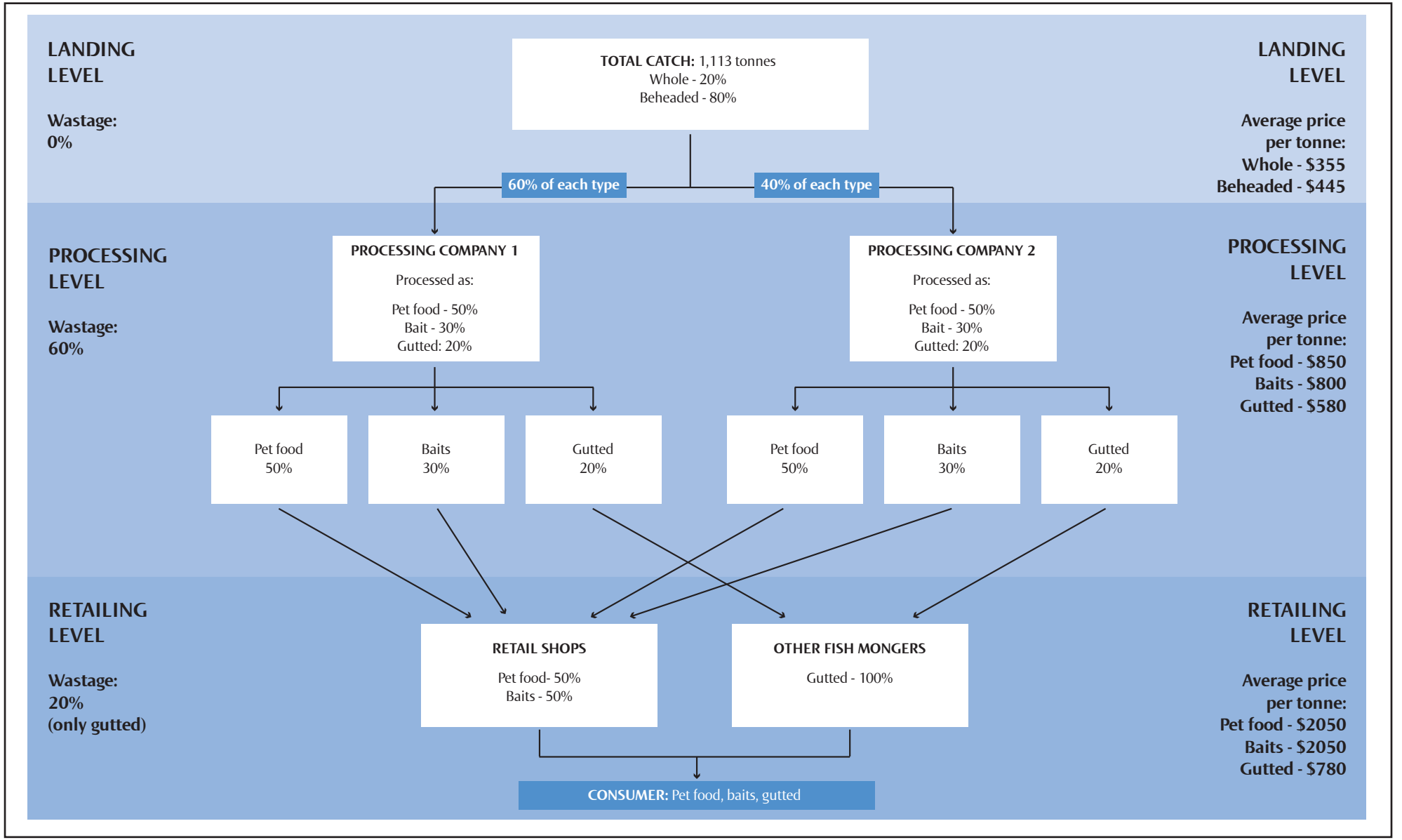


Table B3.1. Value chain model summary

	Purse Seine	Processing Company 1	Processing Company 2	Retail stores	Other fish mongers	Total
Input from sectors within industry ($'000')	0	277	178	1095	117	**1,667**
Input from sectors outside industry ($'000')	410	399	249	1215	108	**2,381**
Total Input ($)	**410**	**676**	**427**	**2310**	**225**	**4,048**
Output to sectors within industry ($'000')	455	743	469	0	0	**1,667**
Output to sectors outside industry ($'000')	0	0	0	2962	266	**3,228**
Total Output ($'000')	**455**	**743**	**469**	**2962**	**266**	**4,895**
Profit ($'000')	45	67	42	652	41	**847**
Wages ($'000')	123	120	75	486	43	**847**
Interests ($'000')	4	20	12	182	16	**234**
Rents ($'000')	8	20	12	182	16	**238**
Value Added ($'000')	**180**	**227**	**141**	**1,502**	**116**	**2,168**
Value Added in %	8.33	10.45	6.54	69.31	5.37	**100**
%Profit	10	9	9	22	16	
%Wages	27	16	16	16	16	
%Interests	1	3	3	6	6	
%Rents	2	3	3	6	6	

Table B3.2. Annual quantity and value of fish caught by Purse Seine method

Types	Quantity in tonnes	Landing price ($/t)	$ Value (in '000' $)
Australian Salmon	1113	400	445
Total	**1113**		**445**

Table B3.3. Cost of inputs from external sectors to fishermen

Cost items	Landing Cost ($/t)	Assumed Cost share (%)
Purse Seine cost	110.5	30
Packaging	36.8	10
Fishing gear and maintenance	73.7	20
Insurance	3.7	1
Licence and fees	7.4	2
Rental and lease	3.7	1
Ice cost	11.0	3
Auction charges	0.0	-
WAGES	110.5	30
INTEREST	3.7	1
RENTS	7.4	2
OVERHEADS		-
Total	**368.33**	**100**

Table B3.4. Cost of inputs from other sectors to processors ($/tonne)

	Processing company 1		Processing company 2	
Sectors	**Whole**	**Beheaded**	**Whole**	**Beheaded**
Purse Seine catch	355	445	355	445

Table B3.5. Cost of inputs from external sectors to processors

	Processing Company 1		Processing Company 2	
Cost Items	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**
Delivery	124.67	20	119.24	20
Interests	24.93	4	23.85	4
Energy	112.21	18	107.32	18
Electricity	81.04	13	77.51	13
WAGES	187.01	30	178.86	30
INTEREST	31.17	5	29.81	5
RENTS	31.17	5	29.81	5
OVERHEADS	31.17	5	29.81	5
Total	**623.37**	**100**	**596.20**	**100**

Table B3.6. Cost of fish inputs from other sectors to retailers

	$ Value per tonne		
Sectors	**Pet food**	**Baits**	**Gutted**
Retail shops	2050	2050	
Other fish mongers	2050	780	780
Processing company 1			
Other fish mongers	2050	2050	
Retail shops	2050	780	780
Processing Company 2			

Table B3.7. Cost of inputs from external sectors to retailers

	Retail shops		Other fish mongers	
Cost Items	**$ cost per tonne**	**% of total**	**$ cost per tonne**	**% of total**
Electricity	227.51	10	71.57	10
Energy	113.76	5	35.78	5
WAGES	910.04	40	286.26	40
INTEREST	341.27	15	107.35	15
RENTS	341.27	15	107.35	15
OVERHEADS	341.27	15	107.35	15
Total	**2275.10**	**100**	**715.65**	**100**

Table B3.8. Fish flow from fishermen to other sectors within and outside the industry (%)

Sectors	Product type	Purse Seine	Processing Company 1	Processing Company 2	Retail Stores	Other Fish Mongers	Consumers	Total	Wastage
Purse Seine	Whole	20							
	Beheaded	60							20
	Total	**80**						**80**	**20**
Purse Seine	Whole		12	8					
	Beheaded		36	24					20
	Total		**48**	**32**				**80**	**20**
Processing Company 1	Pet food				20				30
	Baits				12				18
	Gutted					16			4
	total				**32**	**16**		**48**	**52**
Processing Company 2	Pet food				20				30
	Baits				12				18
	Gutted					16			4
	Total				**32**	**16**		**48**	**52**
Retail shops	Pet food						50		
	Baits						50		
	total						**100**	**100**	**0**
Other fish mongers	Gutted						80		20
	total						**80**	**80**	**20**

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