International trade performance
of the South African fish industry

by

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Abstract

In an effort to gain a better understanding of the trade in fish products by South Africa a starting point is examining South Africa’s current trade in fish products. Useful tools in this regard are the Gini-coefficient, used to examine the degree of concentration for fish exports, and the intra-industrial trade coefficient (IIT), used to examine the balance of international fish trade by South Africa. The Gini-coefficient for fish exports shows that fish export by South Africa is highly concentrated. The trend in concentration appears to have remained constant, and therefore the South African fisheries industry may boast a competitive advantage. However, cognisance should be taken of the fact that such a high level of concentration may render the South African fisheries industry vulnerable to exogenous changes. The IIT analysis shows that, after 1985, the fisheries industry underwent substantial changes in that it has increased exportable surpluses, probably as a result of increased specialization and competitiveness.

1. Introduction

In 2000 South Africa harvested between 200 000 and 250 000 tons of round fish (pelagic species) to produce 45 000 to 55 000 tons of fishmeal and 5 000 tons of fish oil at 10 processing plants. Seven canning plants process sardine and tuna. Most of the fish production is sold frozen (57 processing and freezing plants). Exports amounted to about 100 000 tons, valued at USD558, 3 million in 2000. In 2001 and 2002 the total export was about USD673, 7 and 348, 34 million respectively, the percentage of export by weight as follows:

Table 1: Distribution of export by type (value-US$ million)

<table>
<thead>
<tr>
<th>Item</th>
<th>2001</th>
<th>Percentage</th>
<th>2002</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frozen</td>
<td>321,401</td>
<td>47.71%</td>
<td>74,789</td>
<td>21.47%</td>
</tr>
<tr>
<td>Fresh</td>
<td>222,651</td>
<td>33.05%</td>
<td>144,286</td>
<td>41.42%</td>
</tr>
<tr>
<td>Prepared preserved or canned</td>
<td>26,337</td>
<td>3.91%</td>
<td>17,100</td>
<td>4.91%</td>
</tr>
<tr>
<td>Crustacean and molluscs</td>
<td>96,172</td>
<td>14.27%</td>
<td>106,843</td>
<td>30.67%</td>
</tr>
<tr>
<td>Dried, smoked and brined</td>
<td>7,149</td>
<td>1.06%</td>
<td>5,320</td>
<td>1.53%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>673,710</strong></td>
<td></td>
<td><strong>348,338</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: TIPS (2003)
In 2003, of the total exports (by volume) 33 per cent and 18 per cent went to Spain and Italy as the main destinations. Export to the rest of European Union (EU) represented only 14.5% of total export, while 3% of the volume exported went to markets on the African continent, i.e. Democratic Republic of the Congo, Zimbabwe, Zambia, Mozambique and Mauritius. Exports were valued at USD 358 million (TIPS, 2002).

Annual fish consumption in South Africa is estimated at 6.4 to 6.7kg per person, which is relatively low. Thirty percent of South Africans' food budget is spent on meat other than fish. Only 4% of the food budget is spent on fish. Expanding the market internationally is therefore of vital importance to the South African fish industry. Note, furthermore, that not all the fish harvested by South Africa necessarily serves to satisfy domestic demand for fish products.

In an effort to understand the trade performance in fish products by South Africa better, a starting point is examining South Africa’s current trade in fish products. Hence the objective of this paper is to analyse the international trade performance of the South African fish industry. Useful tools in this regard are the Gini-coefficient, used to examine the degree of concentration for fish exports, and the Intra-industrial Trade coefficient (IIT), used to examine the balance of international fish trade by South Africa. Moreover, Lubbe (1992) states that, in order to evaluate countries’ international trade performance, concentration indices can be used as proxies for determining specialization and the market power of a country. The analysis will reveal the level of specialization and/or diversification in fish trade by South Africa.

2. Data and methodology used

This analysis uses primary data from South Africa Marine and Coastal Management, Department of environmental Affairs and Tourism, and secondary data from sources such as Statistics South Africa and International Trade Centre (ITC). To evaluate the trade status of the South Africa fish industry, the Gini and IIT coefficients are used. The tools are discussed in the next subsections.
2.1 The Gini coefficient

The extent of concentration is determined by various factors, such as consumer preferences that result in different trade streams; trade barriers prohibiting or restricting trade between different regions and of certain products or product types; trade agreements and trade incentives; infrastructure; political stability or instability in a country; and the ability to pay, which is a function of income (Lubbe, 1992).

The Gini coefficient is defined graphically as a ratio of two surfaces involving the summation of all vertical deviations between the Lorenz curve and the perfect equality line. The Gini coefficient was developed to measure the degree of concentration (inequality) of a variable in a distribution of its elements. It compares the Lorenz curve of a ranked empirical distribution with the line of perfect equality. This line assumes that each element has the same contribution to the total summation of the values of a variable. The Gini coefficient ranges between 0, where there is no concentration (perfect equality), and 1, representing total concentration (perfect inequality). The closer the coefficient is to 1, the more unequal the distribution (Brian and Jean, 2005).

According to Hanson and Simmons (1995), a Gini coefficient is a relatively precise measurement of market concentration. The Gini coefficient (Gi) is formulated by the following equation:

\[
G_i = 1 - \sum_{k=0}^{k=n-1} (X_{k+1} - X_k)(Y_{k+1} + Y_k)
\]

Where:
- \( G_i \) = Gini coefficient
- \( X \) = Cumulated proportion of the variable being investigated
- \( Y \) = Cumulated proportion of the export value

2.2 The intra-industrial trade coefficient (IIT)

The IIT coefficient is a widely used measure to calculate the degree of trade of countries with each other, and can thus be used to explain trade patterns. The Factor Proportions Theory
posed by Heckscher and Ohlin (Oleh and Peter, 1997), reflects trade flows in complementary goods, based on the relative availability and intensity of factors in the production process. Trade flows between countries occur in complementary goods, owing to the comparative advantage based on differing factor endowments in a perfectly competitive trading environment. Guzin and Haluk (2003) observed a significant increase in the IIT coefficient as a result of simultaneous buying and selling of the same or similar commodities. This trade describes trade in similar but slightly differentiated products, or trade in close substitutes demanded by consumers in different countries, who may have distinct tastes or preferences.

In trade literature, the amount of intra-industry trade, or trade in similar goods, is often taken as a measure of the diversity, degree of specialisation and degree of technical sophistication of a country’s industrial sector. This can be used to infer a country’s ability to compete in a changing environment (Oleh and Peter, 1997).

Grubel and Lloyd (1971) define the IIT index ($GL_{it}$) as follows:

$$GL_{it} = 1 - \frac{|X_{it} - M_{it}|}{X_{it} + M_{it}}$$

Where:

$X_{it}$ = Exports of industry $i$ in period $t$

$M_{it}$ = Imports of industry $i$ in period $t$.

The value of $GL_{it}$ lies between 0 and 1; zero indicates a low trade balance, while a value closer to 1 indicates a high rate of importing and exporting of the same or similar products by an industry.

3. Results and discussion

Figure 1 shows that total fish export by South Africa in 2003 was about USD 358 million. Spain was the biggest importer, accounting for about 33%; Italy followed (17%); the other countries together accounted for less than 50% of exports by South Africa.
Figure 1: Distribution of South Africa fish exports in 2003
Source: TIPS (2003)
Rest of Europe includes Denmark, Ireland, Luxembourg, Sweden, New Zealand, Belgium, Switzerland, Netherlands, UK, Greece and France.

Figure 2 shows the Lorenz curve for fish exports from South Africa to 54 countries in 2003. The x-axis reflects the countries that imported fish from South Africa, ranked from low to high. The y-axis shows the cumulative percentages of fish exports by South Africa. As indicated, the cumulative percentage of exports to 46 countries is less than 2%. This indicates that fish exports by South Africa are highly concentrated. The Gini coefficient for fish export was calculated as 0.846.
The trend in concentration appears to have remained the same, i.e. Spain and Italy have remained the main export destinations for South African fish. This may indicate that South African fish exports are competitive in these two markets, which could be a result of consumer preferences towards South African fish products, the ability of the South African fish industry to comply with market requirements, or higher profitability or the exclusion of the Spanish fleets from South Atlantic waters.

Both Spain and Italy are white fish markets. In the past both consumed significant amounts of Cod which has now been replaced by hake. Spain imports hake at significant volumes from Chile, Namibia and Argentina either as fresh fish or fish blocks.

South Africa faces varying tariffs into the EU based on product type ranging from 6 to 15 per cent. Countries like Namibia and Chile, however, have 0% tariffs which gives them a significant advantage over South Africa. The tariff advantage other countries have over South Africa coupled with, the high level of concentration of South African fish exports to the EU (specially Spain and Italy) could render the fisheries industry in South Africa vulnerable to regulatory changes in these markets. Should regulatory changes take place and South Africa cannot comply, it would result in severe financial losses. The problem is compounded by the fact that market differentiations may be very difficult since the Northern European market prefer mainly Cod.

The calculated IIT indices for the fish industry and the total agricultural products are given in Figure 3. Interesting to note is that the two IIT indices have followed similar trends since 1985. Prior to 1985 the IIT for the fisheries industry was significantly higher.
Figure 3:  IIT coefficient for the fish and agricultural industries

The high value of the IIT for the fish industry in the period prior to 1985 can be attributed to the fact that the values of imports and exports of fish products were more or less equal (see Figure A.1 in Appendix A). The significant increase in the IIT for the total agricultural product is a result of a substantial decline in the value of food exports and a slight increase in the value of food imports over the period 1980 to 1985 (see Figure A.2 in Appendix A). From 1986 to 1990 both industries experienced imports and exports of more or less the same value. Since 1990 the gap between the value of food imports and exports narrowed, resulting in a higher IIT, but in the case of the fish industry the gap first increased, then narrowed and then widened again. In the case of the former it may be due to (i) South Africa being accepted back into the world community, (ii) gradual momentum gained after deregulation of the agricultural industry, resulting in a freer domestic market and (iii) the process of complying with the Agreement of Agriculture (AoA) that resulted in a greater number of more open markets, both domestically and internationally. In the case of the fisheries industry, it appears that similar factors to those mentioned for the agricultural products, except point (iii) determined trade flows, but since 1999, the value of exports increased substantially more than the value of imports. This may indicate that the fisheries industry has been able to increase its exportable surpluses because of increased specialization and competitiveness. The exclusion of the Spanish fleets from South Atlantic waters probably contributed to this state of affairs.
After 2002 the value of fish exports decreased substantially; this may be due to: (i) the substantial decrease of Total Allowable Catch (TAC) for hake in 2002; (ii) the substantial increase of Total Allowable Catch (TAC) for hake in the same year of competitor countries like Namibia (195 000 tons) and Argentina (405 000 tons), and (iii) recent application of non-tariff regulations in EU with respect to food safety.

One should note that the industry has focused quite specifically at growing the international markets as the opening of the SA domestic market has seen some influx of lower priced products (especially in the tinned sector) which made exports virally important. In the light of this the fisheries industry has committed considerable resources to complying with international standards and regulations that inter alia contribute to greater competitiveness in sophisticated markets (Jooste, Kruger and Kotze, 2003).

5. Conclusions

This paper investigated the trade performance of the South African fish industry. The analytical tools used were the Gini and Intra-Industrial Trade coefficients. These tools are useful for measuring the level of concentration and patterns in trade.

The Gini coefficient for fish exports shows that fish exports by South Africa is highly concentrated. Of the 54 markets to which South Africa exports fisheries products, the bulk goes mainly to Spain and Italy. The trend in concentration also appears to have remained the same, i.e. Spain and Italy have remained the main export destinations for South African fish exports. It therefore appears that the South African fisheries industry may have a competitive advantage in these two markets, but cognisance should be taken that such high levels of concentration may render the South African fisheries industry vulnerable to exogenous changes (e.g. in EU policies and standards) if it is not based on “true” competitiveness fundamentals.

The results showed a high IIT for the South African fisheries industry prior to 1985, meaning that imports and exports were more or less equal. Thus, during this period South Africa exported fisheries products of approximately the same value as that imported, possibly implying that the local industry did not cater entirely for domestic demand. The situation,
however, changed after 1985, indicating that the industry has undergone substantial changes in that it has been able to increase its exportable surpluses, probably as a result of increased specialization and competitiveness.

The analysis conducted does not pertinently explain the factors that sustain the levels of concentration, nor does it highlight specific factors that may underpin the competitiveness of the industry, and hence further analysis in this regard is necessary.
References


Oleh, H. and Peter, K. (1997). Intra industrial trade of Arab countries: An indicator of potential competitiveness. Available at: 

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Appendix A

Figure A.1: Trends in South African fish exports and imports

Sources: TIPS (2003)

Figure A.2: Trends in South African agriculture exports and imports

Source: TIPS (2003)