MEASURING CHINA'S EXPORT COMPETITIVENESS IN SEAFOOD MARKETS: A STRATEGIC MANAGEMENT APPROACH.

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ABSTRACT

China accounted for over 8 percent of world exports by value in fish and shellfish in 2002. Over the period 1998-2002 it rose from 4th to 2nd largest amongst exporting countries. Yet, there has been surprisingly little analysis of the trading performance and international competitiveness of China in world fish markets. This paper analyses China's export performance over the period 1998-2002 for fish and shellfish and the strategic positioning of its export trade relative to market opportunities. Export performance is measured through a trade shares decomposition analysis of world and China's trade in fish products. Traditional business strategy and portfolio models examining competitiveness rely heavily on measures of relative market shares and market growth. Trade theory on the other hand has tended to focus either on domestic resource cost, measures of comparative advantage, or bilateral measures of trade penetration. This paper synthesizes approaches derived from international trade theory with those of strategic management, through the concept of an Attractiveness-Position (A-P) Indicator and multivariate analysis. These have been derived from UN trade statistics on export values of fish and marine products in terms of importing country shares of world trade, exporter shares of importing country trade and growth rates in these shares, together with import market size and growth over the period 1998-2002.

Keywords: China; fish exports; trade shares accounting; A-P indicator, strategic management; competitiveness

INTRODUCTION

Given the importance of fish and fish products to China's agricultural and food export trade and that China is the world's 2nd largest exporter of these products, there have been surprisingly few studies focussing on its trading performance and international competitiveness in fish, compared with for example, those for its agricultural products [1,2,3]. This paper sets out to examine changes in China's export performance, and to evaluate the strategic position of its trade in unprepared (i.e. live, fresh, chilled, frozen and dried) fish, crustaceans, molluscs and marine invertebrates[b] –hereafter referred to as fish for brevity. Much of present world trade is concentrated into regional blocks reflecting regional trade agreements, freight costs and the impact of non-tariff barriers on international trade[4]. However, the accession of China to the WTO, and the current WTO negotiations may free access to some key markets for China. It is therefore relevant to examine China's current export markets for fish to determine its strategic position and competitiveness within them. This paper amalgamates the approaches to strategic management portfolio analysis and classical international trade to determine China's competitiveness and positioning in its export markets for fish.

Between 1998 and 2002 the value of China's exports of unprepared fish rose from US $1.7 billion to almost US $3 billion. Prepared fish products, not the subject of this paper, accounted for a further US $1.6 billion of its exports in 2002. Exports of unprepared fish thus constituted 27 % of China's

agricultural, fish and food exports involving only primary processing and over 8% of the world exports of unprocessed fish by value.

The export product mix from China comprises predominantly of frozen fish products, with fish fillets accounting for 29% of its exports by value and other frozen fish a further 14% in 2002. Furthermore, China's share of world trade in these products exports exceeded 20%. Crabs prawns and shrimps made up 13% of exports. Table I presents China's exports by sub-products and its share of world trade in fish, together with annual trend growth rates.

Table I: The composition of China's and World fish exports by value in 2002.

Product	China trend (%pa)	World trend (%pa)	Share China's Total (%)	China Share of World (%)	Product Share of World Total (%)
All sub-products 03	13.0	2.6		*8.8*	
Fish fillets fz	18.0	3.6	30.2	21.1	11.2
Other Fish fz,	24.0	4.1	13.7	21.2	5.6
Shrimps and Prawns	10.0	-2.1	9.5	6.0	16.4
Molluscs fr/chilled	14.0	0	6.1	31.4	1.6
Fish chilled	2.0	1.7	5.0	10.0	4.5
Squid, Octopus etc	11.0	4.5	4.5	19.5	2.0
Crabs fz	15.0	12.8	3.2	11.0	2.3
Molluscs fz/dried/salted	5.0	0	1.9	10.5	1.8
Livers and roes, fz	6.0	18.5	1.6	9.3	1.6

Annual trend export growth rates over the period 1998-2002 have been particularly high for frozen fillets and other frozen fish (18% and 24% respectively), and for crabs(15%) and fresh/chilled molluscs (14%). Overall China's exports of fish grew at an annual trend rate of 13% compared with 2.5% for the world as a whole, and generally exceeded world market growth rates for most sub-products. Table II shows China's exports by destination and trend growth rates in exports to these markets 1998-2002

Table II; China's Export Markets and Growth rates for Fish

Export Market	$US mi	Trend '98-02 (% pa)	Share China's exports 2002 (%)
Japan	1096	9.0	38.15
Korea	633	36.0	22.03
USA	465	17.0	16.19
Hong Kong	193	-1.0	6.72
Germany	123	9.0	4.28
Canada	55	29.0	1.91
Taiwan	47	2.0	1.64
UK	37	44.0	1.29
Poland	29	104.0	1.01
Others	195	3.5	6.8

Well over one-third of exports go to Japan, and the E Asian market accounts for two-thirds of all exports. Export growth has been strong into Korea, but penetration of other markets such as Germany, Poland, UK, USA and Canada has also been relatively high.

CHINA'S TRADE PERFORMANCE

Changes In World Trade in Fish Products

Table III shows the major importing countries by share of trade and trend growth rates in imports. It underlines the fact that China is present in almost all of these major markets. However, although China has experienced a rapid growth in its exports of fish, in assessing whether it is achieving competitive advantage, it is important to identify whether this is due not only to any overall growth in world trade, but also as to how China's position in these markets has changed relative to their growth and changes in the balance of world trade amongst the various importing countries.

Table III: Major World Importers of Fish

		Imports $US bn in 2002	Trend %pa '98-02	% share World Total
World (incl China)		44155	2.5	
Japan	**JA**	10972	0.0	24.85
Usa,	**USA**	8416	4.0	19.06
Spain	**SP**	3765	4.0	8.53
France	**FR**	2439	-2.0	5.52
Germany	**D**	1690	-2.0	3.83
Korea rep.	**KO**	1676	31.0	3.80
Hong Kong	**HK**	1601	3.0	3.63
China	**C**	1565	23.0	3.54
UK	**UK**	1360	1.0	3.08
Canada	**CA**	1030	3.0	2.33
Singapore	**SG**	363	1.0	0.82
Australia	**AU**	320	0.8	0.72
Malaysia	**MA**	299	10.0	0.68
Poland	**PL**	280	2.0	0.63

The analysis therefore uses trade shares accounting (TSA) in order to identify the sources of any change in China's aggregate market share (AMS) of world fish trade.

Trade Shares Accounting

TSA [5] decomposes the change in aggregate (world) market share of a country over a period into two elements .

- A ***structural effect*** reflecting the AMS an exporting country would have achieved in the final period given its initial base period shares.
- A ***performance effect*** measuring the overall change in AMS in the final period due to changes in its export market shares over and above the fixed performance structural effect.

In the context of this analysis, the structural effect thus measures changes in China's AMS for fish strictly in relation to changes in the composition and volume of world trade in the commodity. Hence the performance effect can be considered to represent its export competitiveness in terms of the additional contribution to its AMS made by those changes to its individual export market shares due only to gains or losses in market penetration.

It is convenient for exposition to present the approach in the context of a "two country or region" world. Let **i** be a specific importing country or export market for country **c, r** denote all other countries, and **x** as a trade flow such that x_i^c is the value of imports by country i from c^c. Define $\mathbf{s_i^c}$ as country c's share of market i

$$s_i^c = \frac{x_i^c}{x_i^c + x_i^r} \qquad \text{(Eq.1)}$$

Define the structural share of importing country i as $\mathbf{S_i}$, its share of world trade (imports). Hence

$$S_i = \frac{\left(x_i^c + x_i^r\right)}{\sum_i x_i^c + \sum_i x_i^r} \qquad \text{(Eq.2)}$$

and by definition $\Sigma S_i = 1$.

Let $\mathbf{s^c}$ represent country c's AMS of total trade. Hence

$$S^c = \frac{\sum_i x_i^c}{\sum_i x_i^c + \sum_i x_i^r} \quad \text{which can be rewritten as} \quad S^c = \sum_i s_i^c \cdot S_i \qquad \text{(Eq.3)}$$

Country c's AMS at time **t** can be decomposed into individual market i components as :-

$$C_{it}^c = s_{it} \cdot S_{it} \quad . \qquad \text{(Eq.4)}$$

Hence the country effect, $\mathbf{E_{i\tau}^c}$ which measures the change in country c's AMS over a period of time between a base period t=b and final time period t=τ in market i is defined as:

$$E_{i\tau}^c = S_\tau^c - S_b^c \qquad \text{(Eq.5)}$$

in which the net effect across all markets or change in c's AMS is given by

$$N_\tau^c = \sum_i E_{i\tau}^c \quad \text{or alternatively as} \quad N_\tau^c = S_\tau^c - S_b^c \quad . \qquad \text{(Eqs.6)}$$

The change in the AMS of country c can be viewed as the sum of two effects. There is the structural effect $\mathbf{SE_\tau^c}$ measuring changes in structural shares i.e. country shares and world trade, and a performance effect $\mathbf{PE_\tau^c}$ measuring the changes in country c's AMS allowing for changes in individual country shares but excluding changes in overall changes in world trade. The TSA decomposition process thus requires three separate measures of country c's AMS. The first is a measure of what its AMS would have been given fixed base period country market shares but final period structural shares (denoted by subscript fτ). The second element is the base period AMS obtained from base period structural shares and country shares (denoted by subscript b). The last element is the final period AMS obtained from final period country shares and structural shares (denoted by subscript τ). Let

$$S_{f\tau}^{c}=\sum_{i} s_{ib}^{c}\cdot S_{i\tau} \qquad S_{b}^{c}=\sum_{i} s_{ib}^{c}\cdot S_{ib} \quad \text{and} \qquad S_{\tau}^{c}=\sum_{i} s_{i\tau}^{c}\cdot S_{i\tau}$$

then the structural effect is given by:

$$SE_{\tau}^{c}=S_{f\tau}^{c}-S_{b}^{c} \qquad \text{(Eq.7)}$$

the performance effect by:

$$PE_{\tau}^{c}=S_{\tau}^{c}-S_{f\tau}^{c} \qquad \text{(Eq.8)}$$

and the total or net effect as

$$TE_{\tau}^{c}=SE_{\tau}^{c}+PE_{\tau}^{c} \quad \text{or} \quad TE_{\tau}^{c}=S_{\tau}^{c}-S_{b}^{c} \qquad \text{(Eqs.9)}$$

In the context of this analysis, the structural effect thus measures changes in China's AMS for fish strictly in relation to changes in the country composition and aggregate value of world trade in the commodity. Hence the performance effect can be considered to represent its export competitiveness in terms of the additional contribution to its AMS for fish made by those changes to its individual export market shares due only to gains or losses in market penetration.

Table IV presents the TSA of China's exports of fish between 1998 and 2002. It reveals that China's AMS[d] increased by 2.6 percentage points over the 5 year period to from 5 to 7.5 % of world trade in fish. Only 0.16 percentage points of this increase was due to structural change in the composition and growth of world trade in fish. Hence over 90% of the increase in AMS is accounted for by an increase in export performance, a measure of China's increasing competitiveness in this market.

Table IV: Decomposition of Changes in China's AMS of Fish Exports 1998-2002

AMS 1998	**AMS 2002**	**AMS Change**
4.95 %	7.54 %	2.59
Structural Effect	**Performance Effect**	**Total Effect**
0.16	2.43	2.59

Table V presents the country effects or contributions to China's increase in AMS over the period for its major export customers. It reveals that over 40% of the performance effect derives from Chinese exports to Korea and a further 25% from increased penetration of the Japanese market. The USA market also contributed to AMS growth. However, China's performance in some EU markets and in Hong Kong declined over the period.

Table V: Decomposition of AMS Change into Country Effects

	Country contribution (percentage points)
Australia	0.03
Canada	0.09
France	-0.01
Germany	0.01
Hong Kong	-0.05
Japan	0.63
Korea Rep.	1.09
Malaysia	0.03
Poland	0.02
Singapore	0.01
Spain	-0.16
UK	0.04
USA	0.82
Rest of World	0.04
TOTAL EFFECT	**2.59**

STRATEGIC ANALYSIS OF CHINA'S EXPORTS

Boston Consulting Group Portfolio Matrix

Traditional business portfolio analysis would employ the Boston Consulting Group [6] approach in assessing where the strategic focus of future activity should be made.. In this there is heavy emphasis on relative market size and market growth. Figure 1 shows the annual average growth rate in imports of fish products over the period 1998-2002 for each of the major importing countries and China's share of the importing country market relative to its next largest competitor. It reveals that the strategic positioning of China's trade is largely unbalanced, with only 1 "*star market*", Korea, (high import growth in which China has a large relative market share); few "*cash cows*" (low growth but relatively large market share) in Hong Kong and possibly Japan; and the remaining markets classified as "*dogs*" with low market share and low growth. A "*question mark*" hangs over Malaysia, which has a high growth rate but in which China has a small relative market share.

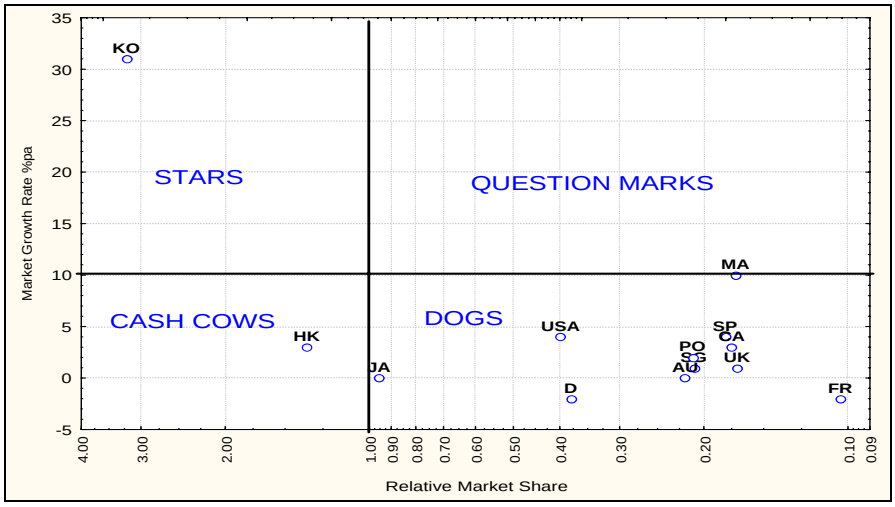

Figure 1 BCG Analysis of China's Export Markets and Performance

Attractiveness –Penetration Approach

However, measures such as market size and growth rates, and even Porter's [7] approach to measuring national competitiveness which relies heavily inter alia on simple export market share measures ignore the relative performance of an exporter in the context of overall world trade and growth, which the TSA analysis addresses directly. Furthermore, although the BCG matrix reflects some elements of the attractiveness of a market and exporter performance, measured respectively through its import growth rate and relative country market share of the exporter, it omits consideration of the other dimensions of market penetration and attractiveness such as their dynamic aspects as reflected in underlying trends. It is these deficiencies which the Attractiveness–Penetration (A-P) approach of Gellynck [8] addresses more directly.

In this paper, we define the measure of an importing country market's ***attractiveness*** to exporter c, $\mathbf{A_i^c}$, as its share of c's total exports in 2002, together with the annual trend growth rate in that share over the period 1998-2002. An attractive market to an exporting country is thus one which absorbs a large proportion of its exports. Hence

$$A_i^c = \frac{x_i^c}{\sum_i x_i^c} \qquad \text{(Eq.10)}$$

The position or penetration, $\mathbf{P_i^c}$ of exporter c in market i is defined by country c's share of i's total imports. Hence $\mathbf{P_i^c = s_i^c}$ as defined in Eq.1 together with the its annual trend growth rate[e]. Hence a strong position is reflected in the exporter's market share of trade with a particular importing country.

There is inevitably a degree of arbitrariness or pragmatism in categorizing the degree of attractiveness to, or the penetration/position of an exporter in a particular market. The BCG analysis typically uses a threshold of 10 percent market growth to categorize markets (see Figure 1). However, world trade in agricultural and food commodities is relatively stable and growth rates more modest than those associated with industrial and consumer goods. In this study, the author's have categorized the A_i^c and $-P_i^c$ measures and their trends as low, medium or high, where :-

Low	<5 %
Medium	5 < 10%
High	>10%

Figure 2 shows the relative positions of China's major markets categorized by bivariate plots of the individual A and P measures with the medium threshold level marked. In terms of attractiveness, Korea ranks as high in level and growth. Germany, Canada, USA, Poland and Japan are markets in which China's position is ranked as medium or high. Only Singapore, Canada, UK, Malaysia, Australia and Poland are markets in which China's A and P growth rates are both medium or high, while Hong Kong, USA, Korea and Japan are markets in which China's A and P are both medium or high.

Clearly from a strategic perspective for an exporter, there may be implicit trade-offs between having a strong position or penetration in a particular export market and a lesser rate of growth in penetration in the market, or vice versa. Similar trade offs are plausible for the attractiveness of an export market and the growth in its attractiveness. We therefore bring together both level and growth dimensions of A and P in Figure 3, together with their categorisation into low, medium and high as a composite A-P indicator.

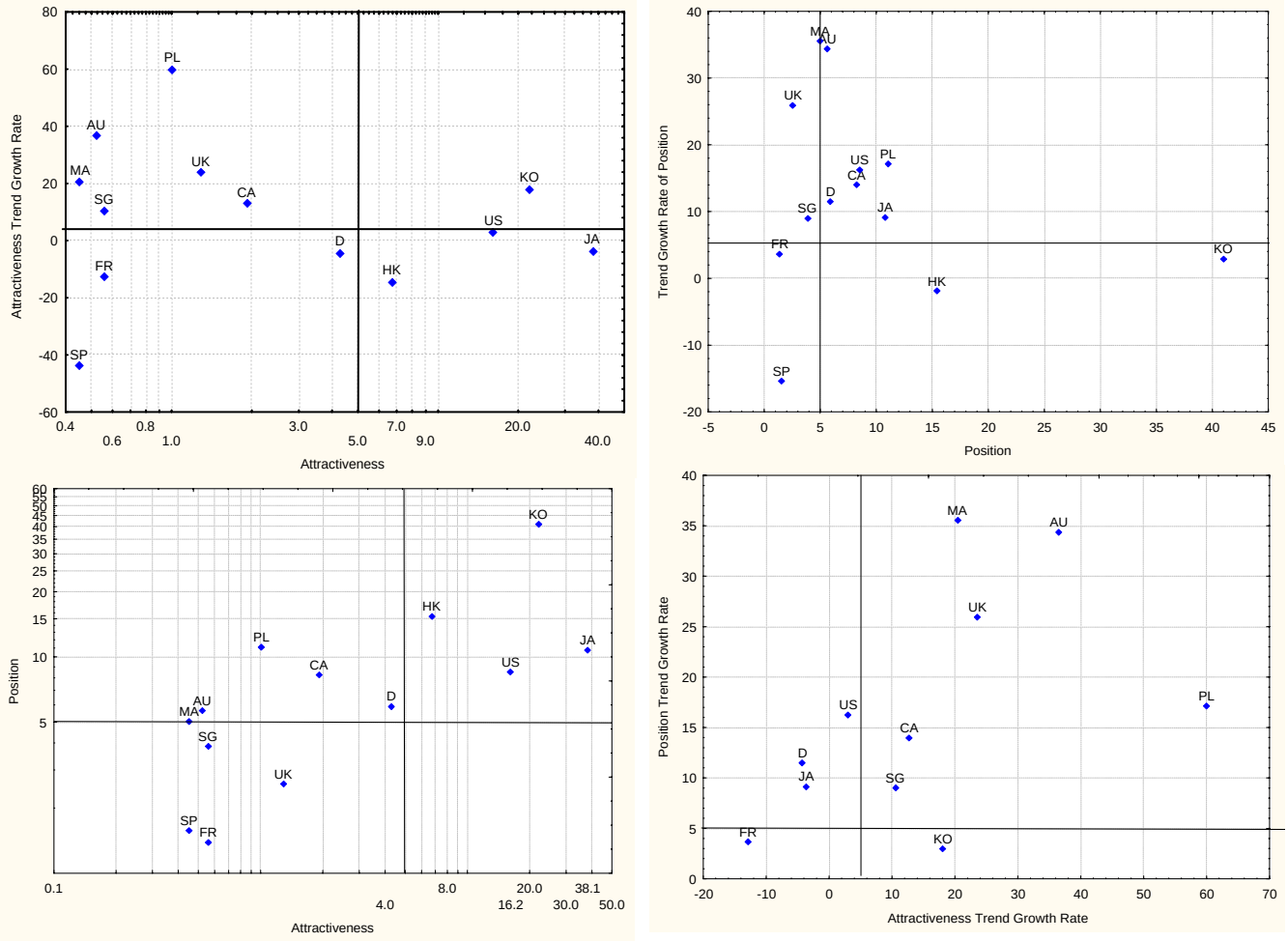

Figure 2. Bivariate plots of A-P measures for China.

The stippled, shaded areas of increasing density to the bottom right hand side of the diagram reflect what might be considered strategically preferable zones in which China might wish to develop further its export markets for fish, where levels and growth in the A and P of the importing country markets both increase. On the other hand those cells towards the top left represent increasingly less desirable markets. The analysis suggests that the China has achieved a strong position in a highly (and increasingly) attractive Korean market, though where growth in penetration is now low. Japan similarly is a market in which China has achieved high levels of penetration but with lower growth potential in both A and P measures. The USA market is an attractive one, where it is suggested there may be potential to strengthen its position given the strong growth rate in market penetration. It is worth comparing Figures 1 and 3 in that the traditional BCG-type analysis would tend to underestimate the strategic importance of both Japan and the USA to China. Poland also appears to be a market with potential, in that although its share of China's fish exports is small, China nevertheless has a strong position in Poland with high growth in both penetration and in market attractiveness.

Position	Attract.	LOW			MEDIUM			HIGH		
	%ch pa	Low	Med	High	Low	Med	High	Low	Med	High
LOW	Low	SPD								
	Med			SG UK						
	High									
MEDIUM	Low									
	Med									
	High	FR		MA AU CA				US		
HIGH	Low				HK					KO
	Med							JA		
	High			PL						

Figure 3. A-P Indicator for China's exports of fish

Hong Kong, as another key regional market for China, appears less promising than these others in terms of future potential, given low A-P growth rates. Overall, the EU markets, together with Singapore, do not appear promising as markets for the strategic development of fish exports from China on the basis of data to 2002. However, it is still too soon to judge whether the liberalization of trade since China both became a member of the WTO and the eventual completion of the present Doha Round of the WTO, will enable China to make much future headway within these markets.

Multivariate Analysis of China's Export Markets

Although the A-P indicator analysis can usefully present the 4 A-P indicator variables in 2 dimensional space, nevertheless, the A-P indicator itself exhibits selectivity in defining what characteristics are of strategic relevance. One deficiency of the A-P indicator is that it ignores the size of various export markets and their growth rates[f]. Hence whilst an exporter may have a strong position in a market, it may be small in size. A weaker position within a larger market may thus from a strategic perspective be more attractive than a strong position in a smaller one, if export revenues from the former are greater.

The A-P analysis has therefore been augmented to include two additional variables to incorporate market size and growth. Hence it includes variables measuring the importing country share of world imports, and the its import growth rate. It thus includes one element of BCG analysis, and also a scale measure of relative market size. From a distance matrix[g] of the 6 indicator variables, a multi-dimensional scaling (MDS) analysis[h] [11] of the export markets was conducted. Of course, specific interpretation of dimensions which are combinations of several variables presents its own difficulties. Figure 4 displays the MDS analysis of the augmented data set. Although the analysis now contains two additional variables to reflect size and growth of country export markets, comparison with Figure 3 suggests that the multivariate dimensions can still spatially be interpreted as reflecting attractiveness (Dimension 2) and position (Dimension 1), albeit with some rotation of their positioning on a now continuous ordinal scale of measurement and with that of dimension 1 reversed. It does perhaps indicate that strategically, Hong Kong and Poland may be of lesser importance than the A-P analysis suggests when taking into account its market size and growth.

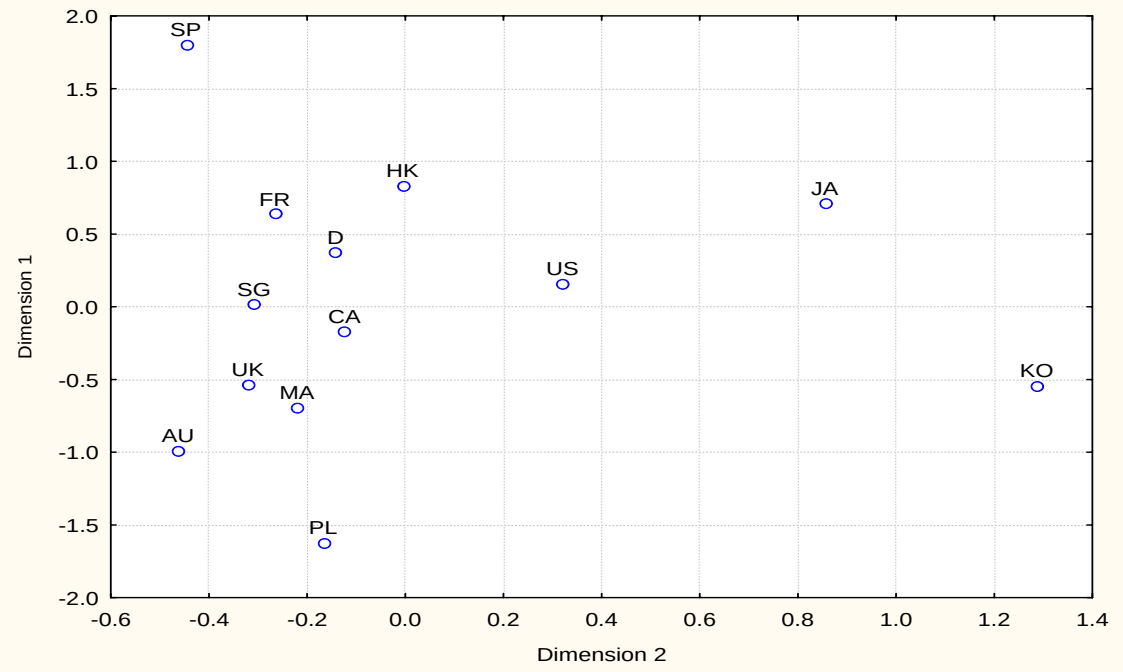

Figure 4. Multidimensional scaling analysis of China's export markets for fish

CONCLUSIONS

China's AMS of world trade in fish has risen over the period 1998-2002 by 2.6 percentage points. This has been largely as a consequence of China's improved competitiveness, as revealed through TSA analysis, in which the performance effect accounted for more than 90% of the AMS increase. It suggests that China has therefore made successful inroads into importing countries which themselves are accounting for a greater share of world imports. Most notable in this respect are the Korean and Japanese markets. However, China has lost ground in some EU countries and in Hong Kong. Further research is needed now to identify the sources of China's competitive advantage in exporting its fish products.

Although the TSA analysis implies that the country portfolio of China's export markets are those which in sum have increased their shares of world trade in fish, there are other factors that are equally relevant in evaluating the longer term strategic orientation of its export markets. These include market size and growth rate, as well as the changes in China's market penetration and in the dominance of certain customer countries in China's fish exports. The BCG and A-P analyses both show that the Korean market is an important one for the future of Chinese fish exports, and this is confirmed through the results of the augmented MDS analysis (combining BCG and A-P measures). However, the A-P and MDS techniques give a more complete picture than both the BCG and TSA approaches, and indicate that the Japanese and USA markets are of strategic importance to China as importers of fish, and that the Polish market also offers strategic opportunity.

The application of the TSA and A-P analyses might usefully be extended in two directions for future research. First the TSA analysis could equally be used to evaluate the comparative performance of key competitor exporting nations to China within the major import markets. Second, insofar as there may be differences in the overall mix in China's exports of fish sub-products in the HS03 category to different markets, then both the TSA and A-P analyses a more disaggregated product level might generate more detailed insights as to where the competitive strength of China resides.

The paper has demonstrated that it is both useful and informative to combine different index measures deriving from trade theory with those of strategic management in assessing the competitiveness and strategic orientation of China in world trade in fish. Clearly each approach contributes different insights into an overall appraisal of a country's international trading performance. However, the multivariate approach, whilst facilitating the incorporation and combination of a wide range of indicator variables, nevertheless can lack clarity in the interpretation of the meaning of the dimensions derived. It would therefore be preferable for any future analysis to develop some more sophisticated composite indices which more readily permit interpretation.

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ENDNOTES

[a] The authors would like to acknowledge the financial assistance of the National Science Founding Committee in funding part of this work.

[b] Data were supplied from United Nations PC TAS trade database for the period 1998-2002 using the HS classification system of traded products. The products referred to in this paper comprise the category HS 03.

[c] Conversely, and abstracting from any difference between export values fob and import values cif, it also represents the value of exports from country c to country i.

[d] Based on import data, as opposed to export data (cf Table I)

[e] The A-P measures utilized in this study differ from those in an earlier study by the authors on China's export performance in vegetable exports [2], in which position or penetration was defined as the bilateral trading intensity as defined by Vollrath and Johnston [9], while attractiveness was defined as the Revealed Comparative Advantage (RCA) measure of Balassa [10].

[f] Nor does the BCG analysis include market size, only market growth.

[f] Obtained as

$$D(x,y)=\sqrt{\sum_i \left(x_i - y_i\right)^2}$$

[h] The objective of MDS analysis is to obtain a configuration of the data points of the variables within a reduced number of dimensions that can be displayed or mapped from the co-ordinates thus obtained.