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ECONOMICAL ANALYSIS OF HUNGARIAN FISHERIES SECTOR ON THE EXAMPLE OF HORTOBÁGY FISH FARM Co.

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INTRODUCTION

Fishing and fish conserving are equal in age with the human history. At the begining consume of fish was common in the regions of seaside, and natural inland waters. Later the demand for fish began to occure also among people in territories more distant from waters.

The fish production of the world in the last three decades had increased by 3% per year overtaking the sheep and cattle, but understaying the pork and poultry production.

The woldwide consumption of fish products (fish, mollusc, shrimp) reached the value of 14 kg/capita/year. The decrease of volume of marine catches were followed by the increased production of aquaculture.

The consume of fish and its products has old traditions in Europe, mainly in the seaside countries. The present fish consumption of EU countries is 24 kg/capita/year.

In the Middle-East Europe natural conditions made it possible to establish artificial fish farms producing mainly common carp. These plants supplied fish (mainly carp) according to the seasonal requests of the regions. The fish consumption was related to religious festivals and customs.

Despite of the fact that Hungarian fish farming looks back to a tradition of 150 years, the recorded fresh water fish consumption in Hungary has reached the value of 1,74 kg/capita/year (12% of the world average) only in the recent years.

In the begining of 90's the fisheries sector participated also in the accession procedure to the EU. The liberalization of import, the increase of the product sortiment creates new challenges to fisheries sector, which shows a relatively small output within the Hungarian animal husbandry. Today fisheries produce 26 000 tons of fish, which is only 1% of the production value of Hungarian agriculture. Due to the fact that the Hungarian agrarian economy has to be conform to the European political and economical conditions, the fresh water fish processing also has to follow the EU standards, considering consumers' habits. All of these activities has to be made comply with the strict EU rules in the field of nature and enviroment protection.

The targets of this thesis are the following:

1. Investigation of natural parameters, costs, prices and profitability, market possibilities and fish consumption of Hungarian freshwater fish production.
2. Analysis of the production, costs, prices and profitability data of the Hortobágy Fish Farm Co.
3. Examination of the structure of the present and perspective distribution channels of fish products, as well as the proper elements of marketing strategies suitable for the fisheries sector.
4. Elaboration of the parts of proper marketing srtategy.

In order to deduct conclusions, the collected data were analized by the methods of statistics. On the basis of conclusions the thesis formulates recommendations in the field of production, processing, commerce, and the alternative utilization of fish farm, as well as the logistics and

marketing. The evaluation of a marketing strategy derivated from the literature and the own research, is evaluated by a SWOT analysis.

On the basis of new research results the thesis offers practical possibilities to the fish farms which may be essential after the accession to the European Union

1. MATERIALS AND METHODS

The research of the condition of Hungarian fish farms is based on the elaboration of national and international literature, the 25 years field and foreign missions experiences of the author. The survey was executed between 1997 and 2001.

The national data concerning production and economics were collected from the annual reports of Wild and Fish Department of the Ministry of Agriculture, Agrarian Economical Research and Information Insitute, Fish Product Council and the Association of Hungarian Fish Farmers.

National data were compared with the indexes of production, yields,costs, prices and sales of the Hortobágy Fish Farm Co. It was permitted to use company data, but in case of further process the agreement of the company is needed.

The data about consumer prices were collected from „Halászat" periodical, and by personal survey. The production prices were collected from the database of Fish Product Council and by own research of the author.

This thesis investigates the production, commercial and profit data of the most widely produced Cyprinids such as Common carp (*Cyprinus carpio*) and the hybrid of Silver carp (Hipophthalmichtis molitrix) and bighead carp (Hipophthalmichtis nobilis). 90% of the pond production is given by these species.

The collected data were analized by the methods of statistics using MS Excel spreadshet, chart, and function editor softwares.

On the basis of comparsion of statistical lines it is possible to create tables, and with the analysis of ratios conclusions can be deducted. (Roth - Sugár, 1992) The author used these numbers (intensital and comparsion) to analize the production, natural cost, price and income data suitable for the examinations of research hypothesis.

The quantitative variables of production price and costs were processed by arithmetic weighted mean calculations. This method gives more exact result than the simple atrithmetic means.

The most frequent value of the statistical line is the mode. This is a location of central tendency, the other data congregate around it. The mode expresses the nature of variables better than the median or the arithmetic mean. (Manzel, 1983)

The difference of the variables is the variability, which is expressed by a measure called standard deviation (σ). This is the average of quadratic differences derived from the main mean. (Roth - Sugár, 1992)

The values of mode and standard deviation were applicated during the investigations of consumer prices, because according to the author, these data can be evaluated using the above mentioned statistical functions.

The examination between variables, and principles, as well as numeric characterization of the rules of ecomomy are the main tasks of statistics. The correlation analysis is a special method to investigate correspondences. (Manzel, 1983)

The aim of the correlation analysis is to convert the observed correspondences into numeric forms, in order to make the evaluation possible. The deducted relation is the signed (-1±1) correlation coefficient which shows the significance of the stochastic relation. (Kröpfl – Peschek – Schneider – Schönlieb, 2000)

The characters of correlation relations according to Svab (1987) are the following: slack below 0.4; moderate from 0.4 to 0.7; strong from 0.7 to 0.9; very strong above 0.9.

The calculation of direct productivity measures were executed using the methods publicated by Nemessályi (2000) The investigations were extended to prime cost, profit rate and the profit level.

During the elaboration of marketing strategy the author compared the methods of elaborated literatures with his own experiences obtained during a marketing and PR course in the USA.

On the basis of literature referring to aquaculture and the own experiences, the author executes a SWOT analysis in order to evaluate the perspective marketing strategy of the Hortobágy Fish Farm Co.

2. RESEARCH RESULTS

The natural conditions of Hungary, the existing fish pond systems and the consumers habits in the last century stimulated the production of cyprinids. By the end of the 90's national production reached 27 000 tons (Table 1).

Table 1

Fish production in Hungary (1997-2001)

Year	Farm production		Natural catches		Total	
	Gross t.	Market size t.	Gross t.	Market size t.	Gross t.	Market size t.
1997	14 510	9334	7406	7031	21 916	16 365
1998	16 816	10 222	7 265	6 040	24 081	16 262
1999	19 123	11 947	7 514	7 105	26 637	19 052
2000	19 904	12 852	7 101	6 810	27 005	19 662
2001	19 442	13 050	6 638	6 138	26 080	19 188

Source: Ministry of Agriculture, 1999-2001

The main part of fresh water production takes place at the fish farms. In the last five years the rate of farm production increased from 64% to 74%. During the survey period until 2000, the volume of production increased continuously. In 2001 due to the production conditions as well the low prices, there was a decrease in the volume of production.

The structure of market-size fish production is shown on Tables 2 and 3.

Table 2

National production

Year	Common carp		Silver carp		Others	
	Tons	Per cent	Tons	Per cent	Tons	Per cent
1997	6 420	69	2 286	24	628	7
1998	7 069	69	2 247	22	906	9
1999	8 158	68	2 347	20	1 442	12
2000	8 656	67	2 575	20	1 621	13
2001	8 225	63	2 996	23	1 829	14

Source: Ministry of Agriculture, 1997-2001

Table 3

Hortobágy Fish Farm production

Year	Common carp		Silver carp		Others	
	Tons	Per cent	Tons	Per cent	Tons	Per cent
1997	1 104	50	873	40	208	10
1998	1 635	60	890	33	184	7
1999	1 842	59	1 168	37	110	4
2000	1 939	62	1 080	34	124	4
2001	1 383	55	1 003	40	119	5

Source: Hortobágy.F.F., 1997-2001

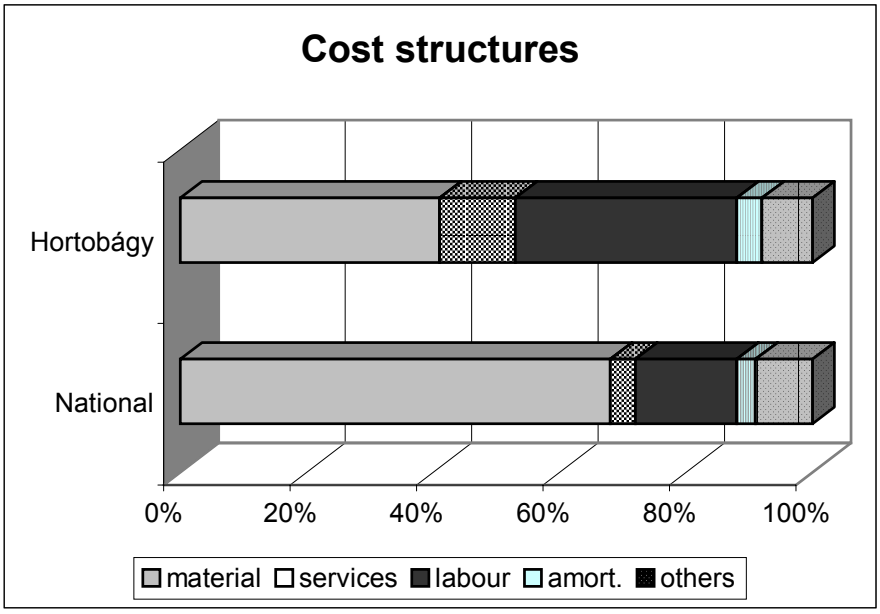
The yield of fish production consist of natural and feeding yields. The rate of these two yields determines the requirement of materials as well as the prime cost of fish. Against to national average of natural yield rate 32.80%, the value at the Hortobágy F.F. is 46.60%. This results 0.5 kg less stach-value use for 1 kg growth of body weight, in comparsion with the national value.

Changes in domestic market conditions resulted an increase in fish consumption. In 2001 the registrated value reached 3.12 kg/capita/year,

which is 4.5% of the total meat consumption. The fish consumption in the EU countries is 24 kg/capita/year.

The national and the Hortobágy Fish.F. cost structures are demonstrated on Figure 1.

Figure 1



Source: Fish Production Council, Hortobágy F.F., 1997-2001

The presentation shows, the differences between national and farm values. At the Hortobágy F.F. the costs of materials are lower, resulted by the decreased artificial food input, while labours costs are relatively high, due to the employment policy of the owner. The cost of water supply is 3-4 times higher at Hortobágy compared to other regions. The reason of more service costs are derived from the operation of fish processing unit and transport costs.

The prime costs of pond production can be seen on Table 4.

Table 4

Prime costs of Hungarian pond fish production (1997-2001)

Year	Area ha	Production tons	Yield kg/ha	Prod. cost Ft/ha	Prime cost Ft/kg fish
1997	18 947	14 510	766	205 004	**268**
1998	20 407	16 816	824	247 817	**301**
1999	21 185	19 123	902	292 525	**324**
2000	22 547	19 904	882	291 490	**330**
2001	22 462	19 442	865	342 046	**395**

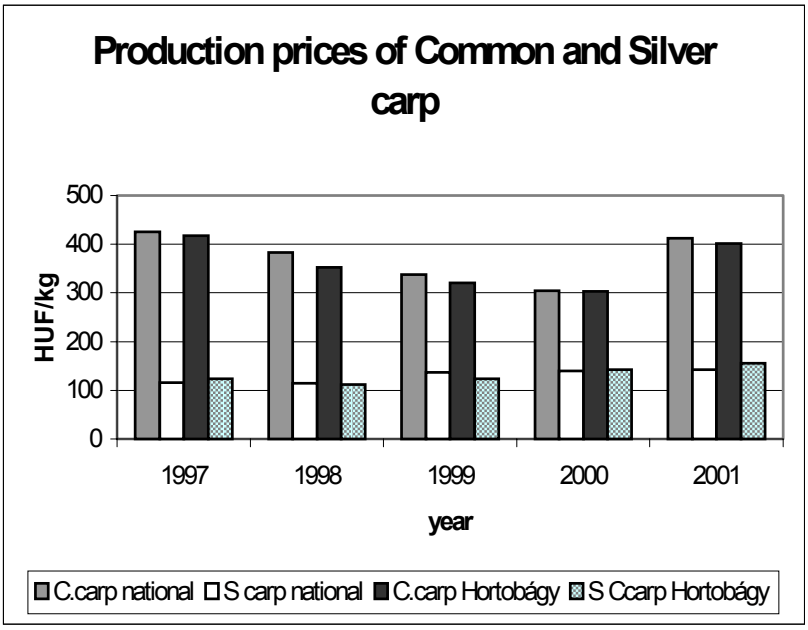
Source: on the basis of Fish Product Council, own research, 2002

Variation of prime cost at the Hortobágy Fish Farm Co.:

1997	1998	1999	2000	2001
236 Ft/kg	271 Ft/kg	303 Ft/kg	334 Ft/kg	376 Ft/kg

The production prices during the survey period are demonstrated on Figure 2.

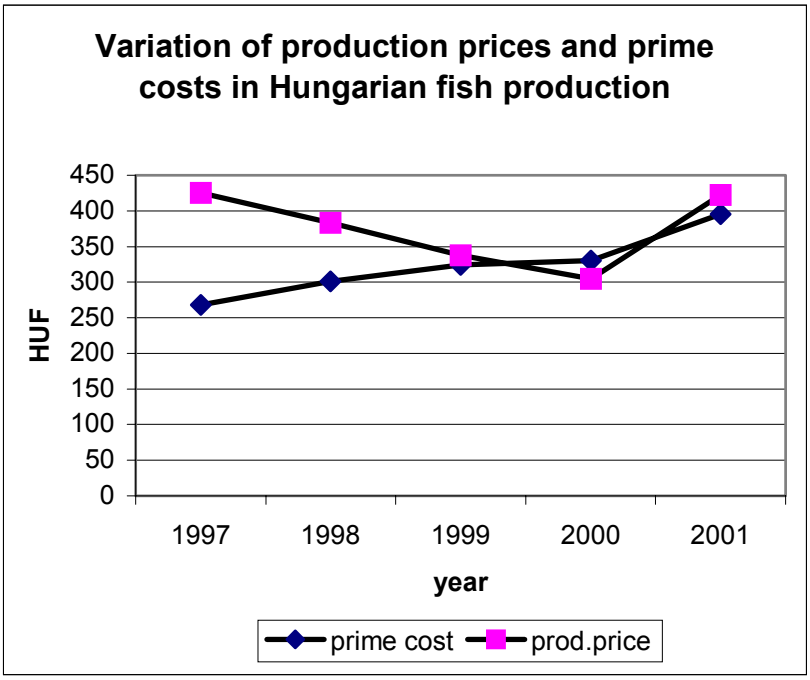
Figure 2



Source: Fish Prod. Council Hortobágy F.F., 1997-2001

The relationship between the production prices and prime costs can be seen on Figure 3.

Figure 3



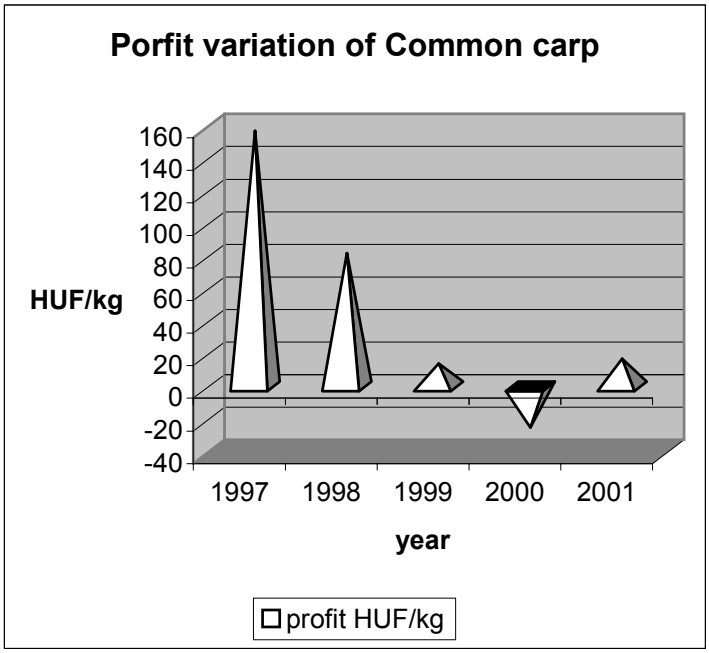
Source:Fish product Council 1997-2001

Analysing the figure above, it can be stated, that the correlation relationship between production prices and production is negative, strong (-0.713), between the producton and consumer prices is positive, very strong (0.946), while between the production and prime cost is negative, very strong (-0.975).

The latter value indicates the incerase of losses during the main part of the survey period.

Figure 4 presents the variation of profit for 1 kg Common carp.

Figure 4



Source:On the basis of Fish P.C. own calculation 2002

In the Hungarian fisheries sector the profit rates and profit levels show the following values:

profit rate (Common carp)	11.42 % (min. –8.20% max. 6.94%)
profit level	12.88% (min. –7.57% max. 58.58%)
profit rate (Siver carp)	11.19% (min. 2.82% max. 7.14%)
profit level	12.53% (min. 2.89% max. 20.69%)

The profit measures of the Hortobágy Fish Farm were calculated using the same methods. The values compared with the national measures are more immoderate.

The values are the following:

profit rate (Commom carp)	12.71% (min. –10.23% max. 45.93%)
profit level	14.55% (min. –9.28% max. 84.95%)
profit rate (Silver carp)	14.59% (min. –0.65% max. 19.01%)
profit level	17.09% (min. –0.64% max. 23.48%)

The following model demonstrates the calculations of profit rates in the case of various Common/Silver carp rates in the production structure.

Table 5

Turnover, costs and profit at diferent Common/Silver carp rates in the production structure (national)

C/S carp rate	Turnover Ft/ha	Cost Ft/ha	Profit Ft/ha
65/24%	230 208	203 964	26 244
70/19%	240 615	213 195	27 420
75/14%	250 523	221 984	28 539

Source: on the basis of Fish Product Council, own research, 2002

Table 6

Turnover, costs and profit at diferent common/Silver carp rates in the production structure (Hortobágy F.F.)

C/S carp rate	Turnover Ft/ha	Cost Ft/ha	Profit Ft/ha
65/24%	199 008	173 438	25 570
70/19%	205 758	179 466	26 292
75/14%	215 302	187 876	27 426

Source: on the basis of Hortobágy F.F., own research, 2002

The results show, that the increase of Common carp rate stimulates the absolute increase of turnover costs and profit. At a rate of 75% of Common carp, the turnover increased by 8.82%, costs showed an

increase of 8.82%, while profit went up by 8.74%. The profit rate in the three groups shows the asme value, due to the fact that the profit rates were similar in the case of the two species (Common carp 11.42%, Silver carp 11.19%).

The increase of the turnover results better distribution in constant costs. According to practical experiences of the author, the optimal rate of Common/Silver carp is 70:30%. In this stucture yield, turnover and profit values are favourable, while domestic and export requirements of Silver carp are ensured.

The investigation of the commercial data of Hortobágy Fish Farm Co. shows that the sales of processed fish products increases dinamically (Table 7).

Table 7

Market channels of Hortobágy Fish Farm (1997-2001)

Year	Pond shore		Whole sale depot		Processing plant		Total	
	kg	Thousand Ft	Kg	Thousand Ft	kg	Thousand Ft	kg	Thousand Ft
1997	1 134 820	308 099	169 141	72 156	15 216	9 275	1 319 177	389 530
1998	1 672 414	420 361	214 844	78 341	50 741	50 741	1 937 999	549 443
1999	1 144 791	302 085	482 061	163 784	383 061	181 961	2 009 913	647 830
2000	688 282	174 963	668 224	219 722	971 851	314 773	2 328 357	709 458
2001	671 568	205 982	498 324	224 437	746 836	307 989	1 916 728	738 408

Source: on the basis of Hortobágy F.F, own research, 2002

The processed fish products can be sold mainly in the department store chains. The variation of sales to this market segment is shown on Table 8.

Table 8

Fish sales of Hortobágy Fish Farm Co. with six retail chains

Year	Quantity kg	Turnover thousand Ft	Turnover increase per cent
1998	40 700	24 261	100
1999	401 052	179 762	740
2000	795 325	308 614	1 272
2001	708 557	332 036	1 368

Source: on the basis of Hortobágy F.F., own research, 2002

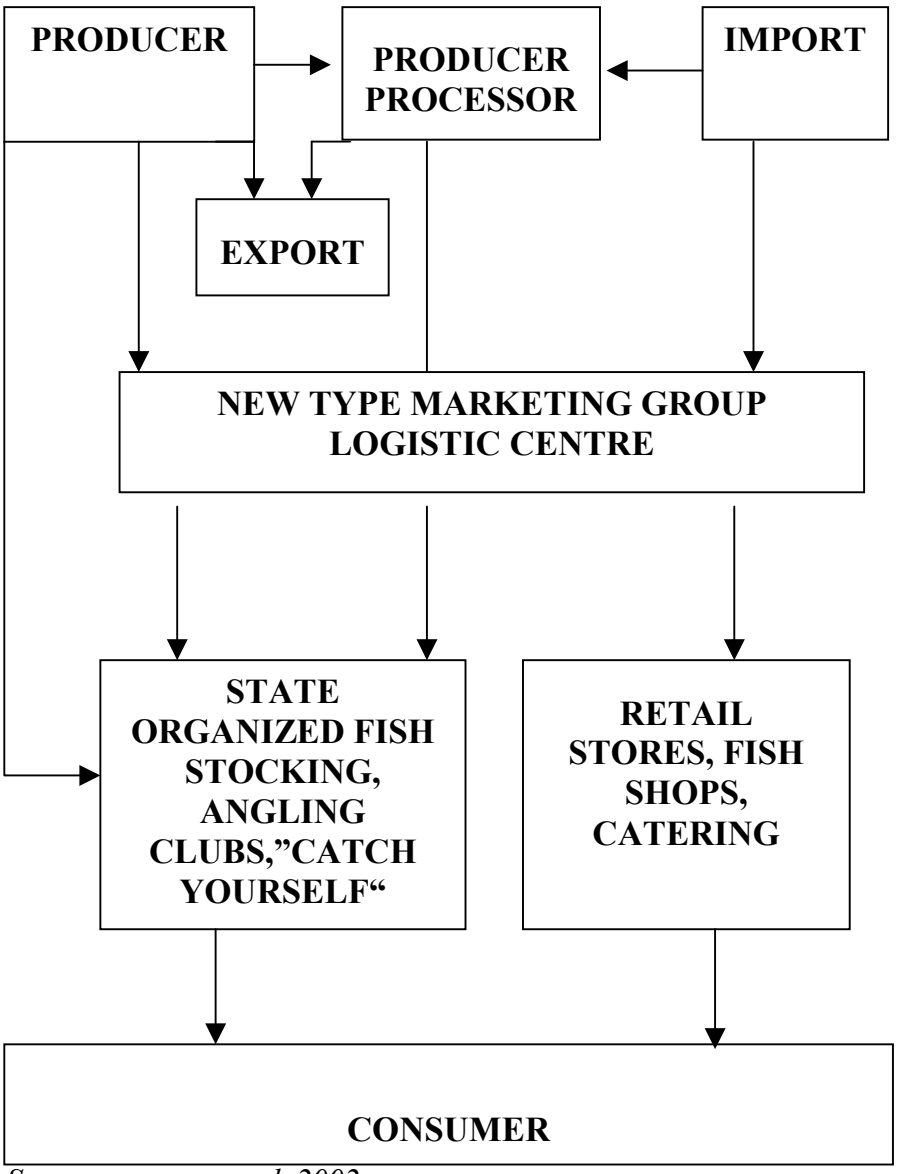
The share of sales of the company realized with chains in 2001 reached 45% of the total turnover.

In the last few years the stucture of national fish commerce has changed. Most of the producers began to sell fish themselves avoiding wholesale commerce. The sales of processed fish belongs to the products range of the sector. Some firms deliver 20-40% of their own production in this form. In the case of Hortobágy Fish Farm Co. the 2001 value was 42%. After the accession to the EU as a result of forming new type selling organizations, the role of logistic centers will incerase. They will store, handle and distribute alive, fresh and frozen freshwater fish products.

According to the results of the survey, the author elaborated the following model of fish commerce after the accession to the EU. The model is shown on Figure 5.

Figure 5

The model of sales channels of Hungarian Aquaculture after the accession to EU



Source: own research 2002

The estimated production volumes, as well as the growing requirements for live and processed fish prognosticates boom for the period of 2003-2005. This favourable situation can be succesfully utilized by adequate cost planning and proper marketing policy.

After the accession to the EU the food industrty will meet stronger competition, therefore the marketing activities has to be converted to the modified situation. According to the opinion of author, the marketing surveys have to follow the 6 P marketing-mix system, such as :

- product,
- place,
- production,
- price,
- promotion,
- publicity

In the fisheries sector, the popularization of the nature protection based fish production, as well as the PR activities take important role in the formation of long term marketing strategies.

The SWOT analysis of the marketing strategy of the company can be seen on Table 9.

9. table

SWOT analysis of the marketing strategy of Hortobágy Fish Farm Co.

Strengths	**Weakness**
▪ excellent natural sources (water quality) ▪ natural fish production technology (chemical free) ▪ wide product range of alive and processed fish ▪ full vertical production, processing system, guaranteed by quality control standards ▪ diversity of continuously delivered fish species ▪ flexible accomodation to consumers' requests	▪ great distance from the determinant market segment ▪ unfavourable structure of capital ▪ weared equipments ▪ low level of technical development ▪ fluctuating fish prices ▪ weak incomes in summer season ▪ limits of credit intake

Opportunities	Threats
▪ estabilishment of logistic centre contolled by sales group ▪ export of alive, and processed fish to EU contries ▪ PR activities, logo policy ▪ production and process of bio-fish ▪ stocking of Tisza lake by native fish species ▪ multifunctional operation using the possibilities of angling and ecotourism ▪ product develonment in fish processing	▪ restricting nature protection rules ▪ intensification of domestic and Middle Europen competition ▪ fish consumption increases slowly due to consumer habits ▪ sales value added fish produts shows very low interest ▪ cheap pork and poultry meat products

Source: Own research, 2002

3. NEW RESULTS OF THE RESEARCH

1. The main part of national carp dominated fish production is performed by the fish farms, and this present rate of 74% will increase after the accession to EU. The modern product structure supposes a higher rate (70%) of Common carp. The incomes , profits and market demand prognosticates more optimal this rate.

2. The research of national fish production, consumer and production prices, as well as the prime costs, resulted to create the following correlation relations:

   - production price – market-size fish production r = -0.713
   - production price – consumer price r= +0.946
   - production price – prime cost r= -0.975

The above mentioned values indicate the considerable market sensitivity of the Hungarian fisheries sector.

3. The detailed statistical analysis of the consumers prices has also given some new research results. The calculation of mode and the standard deviation gives more characteristic scene about the prices, than the simple arithmetic mean. As a result of the survey of consumers prices in the different regions, it can be state, that in Southern Hungary fish prices are lower, than in the northern regions. The difference is 10%/40% in the cases of Common and Silver carps. The explication of the occurence is that in the Southern regions the producers have limited stroring facilities so they sell the harvested fish under national prices. The other reason is the higher fish consumption of the region,

where the great number of small fish shops cause a price decreasing effect. It has to be taken into consideration that after the accession to the EU, the fish commerce will produce more equilibred prices in the country.

4. The results derivated from investigation of the fish product course justify the fact that after the accession the role of intermediate fish commerce will decrease. The producers will establish own sales and logistical centers in order to supply the fish directly to the retail stores and other consumers. The role of retail chain stores is and perspectively will remain determinant in the fish sales. On the basis of the research of sales channels of fish, the author formed the modell of national fish product course for the period of membership in EU countries.
5. It can be deducted as a new result that during the elaboration of marketing strategy it is advisable to use the 6P marketing-mix method. The author regards as a new result the SWOT analysis of the marketing strategy of Hortobágy Fish Farm Co.

4. PRACTICAL ADVISES TO UTILIZE THE RESULTS IN FIELD WORK

1. The fish farm in Hungary should ensure a minimum rate of 70% of Common carp in the product structure with a size of 1.5-2.0 kg/pce.

2. It is recommended to execute a reform in the cost structure of the Hortobágy Fish Farm Co. in order to decrease the labour costs. It is highly advisable to begin the programme of Hortobágy bio-fish production.

3. The farms ought to create angling facilities connected with other spare time activities. The ponds which can be used only for extensive production, should be stocked with fingerling of carnivorous fish species, which are very well sold in the EU countries.

4. Those firms operating fish processing plants, should execute product developing in order to create value added fish products. Boneless fillets, pastes, fish sausages and smoked slices of Cyprinids are suitable for this purpose. It is advised to process and sell imported fishes in summer (grill) season such as trout and Nile perch.

5. The application rules for EU supports and the competition of retail chains will make it necessary to establish processing and sales groups, as well as logistic centres to store, handle and distribute alive, fresh and frozen fish products, applicating updated communications systems.

6. It is recommended to settle a programme, which focuses on the advantages of fish consumption from the health preserving point of view.

7. It is advisable to create an updated informational database system to provide the producers production, veterinarian and market related information.

5. PUBLISHED WORKS OF THE AUTHOR CONCERNING THE THEME

Publications in Hungarian language in revised periodicals:

Szathmári, L. – Tenk, A. (2001): Haltermelés és értékesítés Magyarországon, Gazdálkodás, 2001. 6. sz. 35-43. o., Gyöngyös, 2001.

Szathmári,L-Tenk A. (2002): Édesvízi haltermelés jövedelmezőségének vizsgálata Gazdálkodás, (megjelenés alatt).

A Szathmári,L-Tenk, (2003): A tógazdasági haltermelés ár és költségelemzése Halászat, (megjelenés alatt).

Passage in revised book in Hungarian language:

Ulviczkiné, H. J – Szathmári, L. – Sztanó, J. (2001) Gazdálkodási és szervezési ismeretek – halász- 3-5, 55-68,105-112 o. Agrárszakoktatási Intézet Budapest, 2001.

Revised publications in foreign languages:

Szathmári, L. – Figueiroa, N. (1989): Beneficiamento e conservacao de alguns peixes cultivados em água doce, CODEVASF, Brasília/DF, 1989.

Szathmári, L. (1992): Manual de beneficiamento dos pescados e crustaceos de água doce, DNOCS, Fortaléza/CE, 1992.

Szathmári, L.-Tenk, A. (2001) Fish Production and Marketing in Hungary, Gazdálkodás, 2001. 3. sz különkiadás, 59-67 o., Gyöngyös, 2001.

Publications in Hungarian language:

Szathmári, L. (2001): Marketing stratégia a feldolgozott haltermékekre, TEHAG Kft. Kézirat, Százhalombatta, 2001.

Szathmári, L. – Tenk, A. (2002): Édesvízi halak termelése, forgalmazása és jövedelmezősége Magyarországon, Óvári Tudományos Napok kézirat, 76. o. Mosonmagyaróvár 2002.

Publications in foreign language:

Szathmári, L. – Tenk A. (2002): Fresh Water Fish Production, Commerce and Profitability in Hungary, HAKI, Szarvas, 2002.