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Management Challenges and Product Quality of Fish Farms in Greece

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***Abstract*—**The purpose of the present work is to review some data for the management challenges that the aquaculture industry in Greece is currently facing. The results indicate that Greek aquaculture fish farms apply Human Resources Management (HRM) practices which can increase motivation, commitment and job satisfaction of their personnel. In turn, these practices can increase the productivity of the business. The Greek fish farms appear to invest in research and technological innovation with a good record in research activities and the generation of patents. Interestingly, the results of the present work were carried out during the period of the recent economic crisis in Greece. Several sectors of the Greek economy were severely affected by the financial problems of the Greek government and the Greek banks. Under the adverse economical conditions created by the Greek economic crisis, even the Greek aquaculture industry, which historically is considered as a thriving national exporting business sector, experienced harsh economic and market conditions. As a result of the global, European and national economic crisis, consumption of fish dropped while companies had to hold most of their stocked fish in order to regulated the flow to the market and the price. This occurred at a time where Banks in Greece had their own financial crisis – *banking crisis* - which resulted in limited access to lending for the all business sectors of the national economy including the Greek aquaculture industry. In spite of these economic conditions, the Greek aquaculture industry, after a series of mergers and acquisitions, has now stabilized production and exhibits very good prospects for future growth. Evidently, the firms had to cut salaries and on some occasions even pay their staff in arrears. Nevertheless, the results presented in this paper indicate that during the economic crisis, the surveyed fish farms maintained their HRM practices, investing in their human capital and technological input. In fact, human capital and technological input are the *ticket* for future success of companies in any business sector.

***Keywords*—**Aquaculture, Human Resources Management.

I. Introduction

FARMED fish are the fish which have been produced in accordance to the principles and practices of aquaculture. Globally, the Aquaculture Industry faces a challenge to increase the productivity and reduce the cost of producing farmed fish. The Greek marine aquaculture industry has a significant share in the aquaculture production of the European Union where production is mainly concentrated in 5 countries: France, Greece, Italy, Spain and United Kingdom. Historically, the aquaculture production in these countries accounts for up to 77% in volume and 76% in value of EU totals [1].

The volume of farmed fish production in Greece is now at much lower volume of production than the potential capacity of the country's industry. This is mainly due to the extreme financial difficulties and limited access to credit for the otherwise very healthy aquaculture companies in Greece. Even under these difficult financial conditions for the fish farms, Greece is producing 43% of the total volume of Marine Mediterranean farmed fish. In fact, the Greek aquaculture industry is the second most important economic sector for the growth of the Greek Economy [2].

Currently, the Greek aquaculture industry is going through a series of mergers and restructure. The financial status of the different aquaculture companies, the working conditions and management practices may vary according to lending exposure, market mix, company size, and technological parameters of the different fish farm units and rearing systems. The aquaculture personnel are exposed to harsh environmental conditions and to occupational risk. Under these conditions, there is pressure on the personnel of fish farms to constantly improve their production efficiency and to enhance their work skills to the new methods and practices which are adopted by the aquaculture industry. Nevertheless, a high level of job satisfaction and work performance of the aquaculture personnel is frequently reported and can be attributed, at least partially, to the nature of the work which has a very distinct working environment but most of the staff has very positive experiences with the interaction with their workmates.

There is some evidence to suggest that the Greek aquaculture industry is rapidly adopting and improving new technology and practices of human resources management, including constant training of the staff, very good communication channels between management and the personnel and reducing the risk of occupational hazard to the aquaculture personnel. All these parameters of management may have a determining role for the final product quality and future of this sector in Greece.

Increasing the efficiency of aquaculture production requires technological input and the rapid adoption of new methods, effective communication between different levels of the hierarchy and a team-work climate.

The aquaculture industry in Greece is currently experiencing the consequences of the global and national financial crisis; nevertheless the Greek marine aquaculture industry is constantly increasing the production (Fig. 1) and the labor productivity also increased in the last ten years [3].

A significant portion of this increased productivity of the sector can be attributed to increased technological input and

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skills of the workforce. In fact, the Greek aquaculture industry has a good record in investing in human capital and in technological innovations. In fact there is a historical trend of increased volume of production, labor productivity and adoption of innovation in the production methods by the industry [4].

Investing in technology and the workforce, can result in increased efficiency in the production which also requires the sustainable development of aquaculture to satisfy the global demand for fish and the adoption of fish farm methods which are environmentally, socially and economically viable with the ability to produce the desired quality and quantity of farmed fish in the national, European and the global markets [5]. The results presented in the present manuscript were collected during a research project entitled "Monitoring the quality of farmed fish in NW Greece" which was funded by EU and the Greek state.

II. Methods

This study was carried out to review some data for the management challenges that the aquaculture industry in Greece is currently facing. Data for the production volume, value, imports and exports of the fisheries and the aquaculture industry in Greece, were collected from the Fisheries and Aquaculture Information and Statistics Service of FAO.

Data for the human resources management parameters of the Greek aquaculture industry were gathers from a survey of Aquaculture Managers in Greece. Managers from eighteen fish farms were interviewed, data for the number of employees, productivity length of service, age, level of education and participation in the decision making process were collected. Furthermore a questionnaire for job satisfaction was used to evaluate the level of job satisfaction of the interviewed managers in Greek fish farms. The questionnaire had a seven - point response scale (with a range from Extremely Dissatisfied to Extremely Satisfied) according to the widely used questionnaire of Sutherland & Cooper [6]. The questionnaire of has been adapted and validated with success for usage in Greece [7] and includes questions which explore dimensions of job satisfaction such as level of responsibility, job variety, work climate, the nature of the work, recognition, working hours and wages. Data were analyzed with SPSS and parameters which exhibited normal distribution were subjected to correlation analysis using Pearson correlation.

III. Results & Discussion

The data reviewed in the present work indicate that historically, the fisheries production of Greece increased after 1950, peaked in the 1990s and thereafter the fisheries landing in Greece decline, whereas aquaculture production is rapidly increasing and is currently well above the production levels of the fisheries industry. As a result, the country is a major exporter of farmed fish, while wild fish produced in the country are no longer meeting the demands of the domestic market and wild fish are imported in Greece.

In term of the marketing channels of farmed fish produced in Greece, the reviewed data indicate that the relative value of farmed fish exported or sold in the domestic market changed dramatically during the last five years. Historically, the larger portion of the farmed fish produced in Greece were exported abroad, but after 2005, the volume of production of the Greek marine fish farms increased dramatically (Fig. 1) and the proportion of farmed fish exported also increased to levels above 70% (Fig. 3)

In terms of the profile of human resources of the Greek aquaculture industry, the results of the survey indicate that the managers had work experience which was 6.8 yrs, and had worked in other positions for 12.4 yrs. Most of the farms cultivate more than 2 species, which indicates strength of product mix.

The results indicate that on average, each firm participates in one research project and produces 0.5 patents. The interviewed managers participate in more than one training program each year, and about 80% of their personnel participated in training courses in the previous two years.

A small fraction of the personnel was studying for postgraduate qualification (0.33 ±0.47). Interestingly, the estimated labor productivity is within the range of the national labor productivity reported for Greece.

All of the surveyed managers replied that their companies offered performance related pay schemes and bonuses.

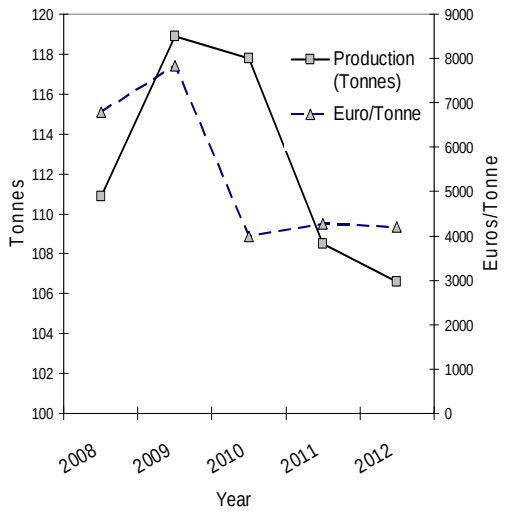

Fig. 1 Annual volume of the Greek marine aquaculture industry (Tones of farmed fish produced, at the left axis of the graph) and value (Euros/Tones, at the right axis of the graph) between years 2008 and 2013. Source: FAO 2013 [1]

The results of the correlation analysis between those parameters which qualified for statistical analysis with Pearson correlation are presented in Table I. The correlation analysis indicates a significant correlation between the length of stay with the current employer and the proportion of personnel which participated in professional training programs or studying for postgraduate qualifications.

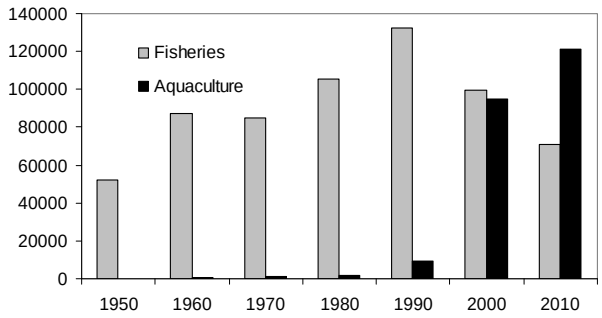

Fig. 2 Evolution of the volume of the total annual Greek Aquaculture production (black bars) and Fisheries (grey bars) production (Tones), for the decades between years 1960 and 2010. Source: FAO 2013 [1]

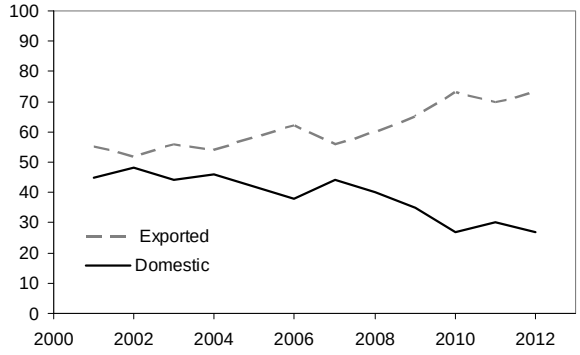

Fig. 3 Changes in the percentage (total value) of Greek aquaculture production exported (dashed line) or sold in the Greek domestic market during the last ten years. Source: FAO 2013 [1]

TABLE I
ANSWERS TO QUESTIONS USED DURING THE STRUCTURED INTERVIEW (AVERAGE ± STANDARD DEVIATION OF DATA FROM 9 FISH FARMS IN WEST GREECE)

	Question	Mean	SD
Q1	How long you worked with your current employer?	12.44	±4.38
Q2	How long you hold your present managerial position	6.89	±3.25
Q3	How many fish species your fish farm cultivates?	2.44	±0.68
Q4	How many research projects is your firm currently engaged in collaboration with Universities?	1.00	±1.25
Q5	How many patents were generated in collaboration with your firm?	0.67	±1.25
Q6	How many times during the last two years you participated in professional training courses?	2.56	±1.50
Q7	What proportion of your personnel, participated in professional training courses during the last two yrs?	80.11	±30.31
Q8	Does anyone from your firm's personnel is currently studying for a MSc of PhD degree?	0.33	±0.47
Q9	How frequently (times/yr) you set up employee orientated staff meetings?	32.00	±17.89
Q10	What was the labour productivity of your unit during the last year?	19.25	±1.23
Q11	How frequently your fish farm had product returns during the last 2yrs?	0.11	±0.42

Furthermore, the work experience of the managers correlated well with the labor productivity of the fish farm units, the frequency of staff meetings and the proportion of staff which participated in training programs. There was a very low rate of products returned from the market. Actually according to the survey, there were only two reasons for products returned to the fish farms: one was due to the recent EU embargo on export to Russia and another was due to poor condition of the fish as a result of problems in the logistics of the supply to the market.

The results of the present survey indicate that there was a very low rate of products returned to the production (0.11 numbers of incidents each year).

The results indicate that Greek aquaculture fish farm firms apply human resources practices which can increase motivation, commitment and job satisfaction of their personnel.

TABLE II
CORRELATION ANALYSIS IN SOME PARAMETERS OF THE SCORES TO QUESTIONS USED DURING THE STRUCTURED INTERVIEW (N=9)

	Q1	Q2	Q7	Q8
Q7	-0,7	0,38*		
Q8	0,05	0,445*		
Q9	0,13	0,315*	0,403*	
Q10	0,5*	0,038	-0,04	0,158

An asterisk* indicates a significant Pearson correlation (P<0.05)

In turn, these practices can increase the productivity of the business [8], [9]. The Greek fish farms appear invest in research and technological innovation with a good record in research activities and the generation of patents.

Traditionally, consumers prefer to purchase wild fish over farmed. Wild fish are considered as testier and in fish restaurants are offered at twice the price of farmed fish. This consumer's attitude may change during economic hardship, and several customers may opt to consume farmed fish, which compared to wild fish are widely available over different seasons and at a much lower price compared to wild fish. Furthermore, there is some evidence to suggest that the aquaculture industry is improving the image of farmed fish including the chemical and structural organoleptic properties of farmed fish which can be important parameters for consumer's attitudes for farmed fish [2].

Interestingly, the present work was carried out during the period of national economic crisis in Greece. During periods of economic crisis, motivation of the staff may be reduced and Human resources practices can help improve the prospects for increasing the motivation and job satisfaction of the personnel [9].

In fact during the last four years the Greek aquaculture industry experienced harsh economic and market conditions. As a result of the global, European and national economic crisis, consumption of fish dropped while companies had to hold most of their stocked fish in order to regulated the flow to the market and the price.

This occurred when Banks in Greece had their own financial crisis [10] which resulted in limited access to lending for the aquaculture industry in Greece. In spite of these economic conditions, the Greek aquaculture industry, after a series of mergers, acquisitions, has now stabilized production

and exhibits very good prospects for future growth with stabilized production value (Fig. 1).

Evidently, the firms had to cut salaries and on some occasions even pay their staff in arrears [2]. Nevertheless, the results presented in this paper indicate that during the economic crisis, the surveyed fish farm companies maintained their Human resource management practices for investing in their human capital and for investing in technological input. Historically, the Greek marine aquaculture industry has a very good record of investment and technological development [11]. The current situation for marine aquaculture industry in Greece and other Mediterranean countries is very different from the period prior to the recent financial crisis in Greece and Europe [12]. During periods of financial crisis, the income of households is reduced and the consumption of fish may be significantly reduced in households with reduced earnings [13]. European countries which produce marine farmed fish may face severe competition from non European countries with much lower production cost and evidently much lower selling price in the European markets. As a result, consumers in Europe may opt to buy farmed marine fish produced in non European countries [14] further affecting the market potential of the Greek marine aquaculture industry.

Under these difficult and adverse economic and market conditions, the Greek aquaculture industry has options for improving the quality of the label image of the products, for example the industry could use food labeling to promote the fatty acid content of fish flesh and the health benefits of consuming fish. In addition the products could be promoted as fish "farmed in the European Union". Furthermore, the industry could increase the production of high added value products [15] including processed fish and the organic farmed fish, which can be sold at premium prices [16], [17] but with consequences for the cost of production [18].

As in any other business sectors, aquaculture firms are faced with a challenge: during periods of financial crisis, successful companies maintain their competitiveness. This requires that knowledge, skills, and abilities of their personnel are used as tools to drive innovation and efficiency [17].

In fact human capital and technological input are the ticket for future success of companies in any business sector [19], [20].

IV. Conclusion

The results indicate that during the economic crisis, fish farms in Greece exhibited Human Resources Management practices which may support the motivation and commitment of their personnel. This investment in human capital may be the ticket for a rapid growth in the future when economic conditions improve. In terms of the Marketing prospects of the Greek aquaculture industry, there is a trend to increase the proportion of exports. This creates an urgent need to develop a marketing strategy for strengthening the label of fish farmed in Greece in the international markets.

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