Extended Abstract

Paper/Poster Title	Comparative technical and economic analysis of mussel farms in Northern Greece

Abstract prepared for presentation at the 96th Annual Conference of the Agricultural Economics Society, K U Leuven, Belgium

4th – 6th April 2022

Abstract	***200 words max***
Mussel farming is a dynamic and export-oriented sector, which plays an important role in the development of coastal areas of Greece, creating job opportunities for local population and providing supplementary incomes for fishermen. Although an increasing number of mussel farms start to adopt an entrepreneurial organization model, most of them are family-based farms with small production. The main objective of this study is to give an insight into the structure and the economic performance of various types of mussel farm. For this purpose, a descriptive technical and economic analysis was implemented on 19 mussel farms in Northern Greece. The results of this study could facilitate stakeholders to design and adopt the appropriate strategies to ensure their viability.	

Keywords	Profitability, Resilience, Risk mitigation, Novel technologies
JEL Code	

Introduction	***100 – 250 words***
In Europe, mussel production constitutes one of the most important sectors of aquaculture. However, a combination of factors – including low economic performance and diseases – has reduced the performance of the sector and jeopardises its viability (Avdelas et al., 2020). Mussel production is an activity of particular importance for specific coastal areas of Greece, especially in the Northern part of the country. The extended coastline in the area combined with climate and weather conditions formulate a favourable environment for mussel production (Theodorou et al., 2010), while also demand is increasing. Mussel farmers are usually fishermen who undertake this activity for additional incomes, however, this option has evolved over time and several producers have undertaken additional investments in order to increase their size and specialize on the enterprise. Theodoridis et al. (2016) pointed out that there is significant heterogeneity across mussel producers and this could potentially affect the implementation of the Common Fisheries Policy in the sector. According to size and development trajectory, mussels are sold to local markets and restaurants or to wholesalers who distribute them to other parts of Greece or export them. Wither as a main activity or as a source of supplementary income, mussel farming is important for the specific areas where it is practiced. Farmers seek for new opportunities to increase their viability, mainly by reducing risks and uncertainties linked to price volatility and losses of production. This paper presents a comparative analysis of mussel farms according to their size.	
Methodology	***100 – 250 words***

Technical and economic data were collected through in-person interviews from a sample of 19 mussel farms using a questionnaire which focused on the mussel production enterprise and included a description of the occupied sea area (ha); family and hired labour (hours); product yields and prices; variable capital cost (e,g. expenses for fuel and consumables); fixed capital (boats, auxiliary equipment, etc.). The study area was Vistonikos Gulf in the Region of Eastern Macedonia and Thrace in Northern Greece, but since only 8 mussel farms operated in the area, the data collected from local farms were checked and refined against a sample of additional 11 mussel farms from Thermaikos Gulf. The total sample, therefore, comprised 19 mussel farms. In order to highlight differences due to size, farms were categorized as large size farms (LSF), medium size farms (MSF) and small size farms (SSF) according to the occupied surface area. Based on this typification, a comparative descriptive technical-economic analysis was employed to provide an indicative picture of the profile, productivity and economic performance of the three groups. For each type, the profile of the "average farm" was developed, as the weighted average of all the farms categorized in each type. The analysis included the presentation of the structure of farm expenses per production factor (land, labour, and capital) as well as the calculation of basic financial results (e.g. gross revenue, gross margin, net profit/loss) and non-parametric statistical tests to highlight differences across types.

Results ***100 – 250 words***

The LSF type achieved higher production volumes per ha, while LSF and MSF required less labour (h/ha) compared to SSF (1717h/ha. 1628h/ha and 4337h/ha respectively). Regarding the sources of human labour, however, there were differences across the groups, as the percentage of family labour over total labour requirements decreased as the size of farms increased (from 63% to 49%), although the cost of hired labour per ha was the highest for SSF (14938€/ha). Moreover, all the groups depended heavily on high investments on boats, which was the basic fixed cost driver. Nevertheless, fixed costs per ha were the lowest for LSF (4010€/ha), but the highest of all categories for MSF (6386€/ha). This indicates that MSF are modernizing their equipment to systemize and intensify production, without, however, achieving optimal size to valorize their investments in an efficient way. It was also interesting to note that there was an inverse relationship between capital costs per ha and the farm size and especially variable costs reduced as size increased, indicating more efficient organization of farms. All these differences were reflected in the financial results of each type. As size increased, productivity and product prices also increased (from 60,0tn/ha and 0.362€/kg to 67.8tn/ha and 0.381€/kg for SSF and LSF respectively). At the same time, LSF operated with the lowest total costs per ha (21155€/ha) compared to the MSF and SSF. As a result, SSF operated with significant net losses (-8632€/ha), LSF with high net profit (5674€/ha), while MSF were borderline profitable (1071€/ha). Gross margin also increased as size increased, which showed the good financial position of larger farms.

Discussion and Conclusion ***100 – 250 words***

The results of the descriptive technical and economic analysis demonstrated that the economic performance and profitability of the mussel sector depended heavily on the size of the farms. The reduced production cost per ha of the LSF implies that large in size farms utilize economies of scale and therefore, can be more competitive in the market. This coincides with Theodoridis et al. (2017), who reported that larger in size farms achieve higher net profit. However, results in this study diverge from the ones

reported by Avdelas et al. (2015), as they reported labor costs at 42% of total costs (in this study this only stands for SSF) and fixed capital costs of at least 30% of total costs (maintenance and depreciation), while in this study fixed costs accounted from 15% to 26% of total costs for SSF and LSF respectively. However, these data were collected from Thermaikos Gulf area and the average farm accounted for average production of 109tn/year and an acreage of 1.8ha. In addition, another important determinant related to the enhancement of the economic performance of the farms is the adoption and the rational use of novel technologies. Larger farms seem to perform better in terms of fixed capital utilization and are organized better. On the other hand, smaller farms are not profitable, but since mussel production is a complementary activity for them, it is important for their viability – especially during periods of the year when fishing of other species is not feasible.

The paper is part of the project “SmartMussel - Smart automatic management system for mussel farms” which was co-funded by the European Union through the Special Actions “Aquaculture – Industrial Materials – Open Innovation in Culture” (T6YBP-00388).

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