Farmer and adviser perspectives on business planning and control in Mediterranean agriculture: evidence from Argolida, Greece

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Farmer and Adviser Perspectives on Business Planning and Control in Mediterranean Agriculture: Evidence from Argolida, Greece

Dimitrios Iakovidis *, Yiorgos Gadanakis and Julian Park

School of Agriculture, Policy and Development, University of Reading, Earley Gate, Whiteknights, Reading RG6 6EU, UK

* Correspondence: d.iakovidis@pgr.reading.ac.uk

Abstract: Adoption and implementation of business planning and control methods is essential to efficiently and effectively allocate resources for producing food within sustainable agricultural systems in the Mediterranean Basin. To investigate this issue, an analysis of twenty-eight representative farming businesses from the National Farm Accountancy Data (FADN) for the region of Argolida (Greece) was undertaken, together with a survey of twenty agricultural advisers (ten agronomists and ten accountants) from the representative associations of agronomists and accountants for the area under study. Results demonstrate farmers' needs for enhancing managerial competencies, particularly the systematic use of planning and control methods, for effective decision making and strategic design. The research illustrates how these methods can serve as a tool to enhance efforts towards a more sustainable approach to farming. Advisers are encouraged to diversify their role from a purely market driven approach to a role which includes guidance and scientific advice for supporting the sector's needs for sustainable development. This will support farmers' decision-making based on the latest scientific knowledge and use of available data to enhance the sustainability of these important agricultural systems.

Keywords: business planning and control; decision-making; decision support tools; farm sustainability; Mediterranean

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1. Introduction

Climate change and the more frequent appearance of extreme weather phenomena [1,2], land degradation, and the increasing scarcity of natural resources have impacted farming and food production in the Mediterranean basin [3]. The traditional structure and organization of agricultural and food production systems in the Mediterranean basin have also been challenged by the changing political, economic, and technological environment [4].

Hence, it is imperative to explore appropriate strategies in which the agricultural sector can overcome these challenges. According to [5], enhancing the managerial attributes of farmers and farm managers is crucial to enable them to balance risks and uncertainties. Several studies have discussed the subject of farm planning and control in the Mediterranean basin [6–8], and have highlighted the importance of improving decision-making processes to enhance the sustainability of farm businesses.

This paper investigates whether farmers intentionally adopt and implement planning and control methods as a decision-making tool to enhance farm sustainability, and explores the factors motivating or hindering them doing so. It also investigates the contribution of agricultural advisers in farm sustainability design and supporting farmers with decision making beyond their normal focus on productivity and profitability. Finally, it explores the current use and the future prospect of Decision Support Tools (DST) as a mechanism to inform decision-making and enhance sustainability.

Successfully addressing the four functions of management (planning, organizing, leading, controlling) is a fundamental of business viability [9]. Historically the management of a farm was based mostly on empirical knowledge passed on from generation to generation. Traditionally it was not necessary for farmers to become involved in many arithmetical calculations, but farm businesses are changing [10]. Today's farmers are being confronted with a range of challenges, for instance rising input costs, lower product prices, escalating interest rates on the purchase of farming land, labour shortages, and the threat of climatic change [11]. These factors are forcing farmers to further develop their business acumen and managerial skills to manage their farming enterprises as efficiently and effectively as possible.

Farmers often have their own perception of what it is to be "a good farmer," and this is not necessarily shaped by the highest economic returns, but has to do with the meeting of existential, stylistic, and moral goals [12]. For example, many US farmers perceive that high input/high output production systems that manage to produce large amounts of food, fibre, or fuel define their identity [13]. However, in Greece and generally in the Mediterranean region, there is a shift towards developing sustainable production systems that can address the societal concerns regarding the environment and the nutrition of people, while still maintaining a viable farm business [14]. This is in part because farmers are experiencing pressure from a variety of environmental factors, such as the increasing need for water use efficiency and decreasing output due to soil erosion [15]. The plain of Argos has already been designated as a nitrate vulnerable zone (NVZ) by the Greek authorities and according to the nitrates directive (91/676/EEC). Generally, farmers are in a unique position: they serve as providers of food and biofuel, but are also obliged to serve as stewards of natural biodiversity and in some cases societal coherence. Ref. [13] notes that social and economic research that guides public policy and farmer practice is needed if society is to establish a balanced equilibrium between sustainable food security, entrepreneurship, and environmental soundness.

In Sweden, research has illustrated that some farmers with lesser entrepreneurial capabilities, often older farmers, tended to be less proactive in making changes and adopting new strategies [16]. Ref. [17] showed that conventional farmers in England were less confident in their abilities as entrepreneurs than those who were engaged in value-added or non-farming enterprises on their farms. According to [18], management and strategic planning are crucial factors in entrepreneurial success, while [19] suggests that strategic management, marketing, and entrepreneurial skills are most necessary for the improvement of English farmers' practice. An entrepreneurial approach may be applied to the development of new products or niche markets. However, [20] suggests that it must not only be restricted to this context, but also extended internally to new mechanisms of implementing processes and procedures so that the already existing products or markets are covered more efficiently.

In the Mediterranean basin, after the end of the second world war, the farmer was often viewed as a rational entrepreneur, according to agricultural modernization theories about making farm processes rational, efficient, and replicable [21]. The emergence of studies discussing the behavioural factors affecting the adoption of sustainable farming, for instance [22], highlighted the need for a more holistic approach to policy-making when designing strategies to support sustainable farming. This enables the consideration of the technical and natural characteristics of the system, but also the behavioural factors influencing farmers' adoption of sustainable farm management practices.

Financial planning and control methods, such as budgeting, programming, and an accurate set of financial statements, assist the promotion of profitability, liquidity, and solvency of the farm business, providing an indication of its financial health [9,23,24]. The findings of [25] suggest that production planning, supported by monitoring farm outcomes, the use of bookkeeping and budgeting practices, and economically oriented objectives also facilitate the technical efficiency of farms.

Overall, the adoption and implementation of planning and control methods depends on the management capacity and inclination of the farmer [25]. The application of analytical management tools as a higher level of business skill leads to increased productivity and improved business outcomes. Other factors affecting the degree of planning and control include education, vocational training, age, farm size, and crop selection [26].

In order to enhance the use of business planning and control methods in the farming systems of the Mediterranean, this paper focuses on the following questions:

1. What are the factors that motivate or hinder farmers' adoption and implementation of planning and control methods in the context of farm sustainability?
2. Does farm sustainability present different challenges to farm advisers beyond the consideration of productivity and profitability?
3. What is the current use of, and prospect for the future use of, Decision Support Tools (DST) to enhance farm sustainability?

Even though farm sustainability is considered an important concept in Greece and the Mediterranean basin, there is limited research which links farm sustainability with farm management practices. The research reported here uses farmers and their advisers to investigate the reasons motivating or hindering farmers' adoption and implementation of planning and control methods, to identify if advisers address farm sustainability holistically or one-dimensionally. The research also explores the current use of, and prospect for the future use of, DST as a means to enhance farm sustainability.

The following sections outline the methodology used to address the research questions, provide greater detail of the study area and the sample methods employed, before presenting results and concluding comments with key messages.

2. Materials and Methods

2.1. Outline of the Research

Data was derived from a sample of farm business advisers, i.e., agronomists and accountants, and farmers from the area of Argolida in the south of Greece, with features typically representative of the Mediterranean basin.

By using these three groups of respondents (i.e., agronomists, accountants, and farmers) a range of perspectives on planning and control were investigated, including the relations and interdependencies between the groups. This enabled a better understanding, justification, and validation of attitudes and behaviours.

2.2. Research Region

Argolida, a regional unit of the Peloponnese peninsula in Greece (Figure 1), was selected as the area for field research.

This area has features typical of the humid mid-Mediterranean climate [27]. It is an area where the cultivation of olive and citrus trees is predominant, which are typical crops for southern and eastern Greece and the wider Mediterranean area. Argolida is one of the major suppliers of oranges for the Greek and export market [27,28]. Olive cultivation, primarily for oil, is considered particularly important for Greek farmers, according to [29]. Greek olive oil production in 2020 was estimated to account for roughly 9% of global production, placing Greece third in the world by volume according to IOOC (International Olive Oil Council) statistics. Collectively, the countries of the Mediterranean basin account for approximately 96.5% of global olive oil production [29], while the EU's Mediterranean area is responsible for approximately 20% of the world's citrus production and 70% of global citrus exports [30].

Figure 1. Map of region of Argolida. Adapted from https://en.m.wikipedia.org/wiki/File:Greece_location_map.svg, (accessed on 7 February 2023).

2.3. Research Participants

2.3.1. Farmers

Farm businesses from the Farm Accountancy Data Network (FADN) for the region of Argolida were used as a basis for this research. The total regional number of participants in the FADN sample was 57 owners/managers for the year 2018. After communicating with farmers for the purpose of recruitment, from the initial 57 farmers in the sample, 29 had to be excluded for various reasons (one of them has passed away in the meantime; another one withdrew from the FADN program; 27 of them did not want to participate in the research mainly for time availability reasons), allowing a sample of 28 farm businesses to be utilized within the research.

2.3.2. Advisers

The advisers interviewed were both agronomists and accountants. They have influence over, and advise on aspects of, the planning and control process, and by the nature of their role are in close contact with farmers. Based on previous published work and similar projects [31], a sample of 20 advisers was considered to provide an adequate representation for the region. The random sampling technique was used to select the participants and to provide an unbiased sample.

Agronomists were considered not only as sources of advice to farmers on production aspects such as agricultural practices, but also as techno-economical consultants. They advised on government or EU funded programmes in which farmers took part, such as organic farming, use of plant protection products, and the new entrants programme in the

agricultural sector as well as other services. The 10 agronomists participating in the study were selected from a pool of 40 agronomist members of the 'Association of Self-Employed Agronomists of the region of Argolida' (i.e., 25% of the total).

Accountants were also considered as advisers, for instance on the farm businesses' financial issues in general, and taxation matters. This included the annually submitted tax declaration, the insurance coverage for farmers, and farm labour and regular VAT returns in relation to income and expenses. In the study area, there were two accountants' associations in the towns of Nafplio and Argos, with 50 members in total. From this pool 10 accountants were selected (i.e., approximately 20% of the total).

2.4. Interview Structure

For the purposes of content analysis, two sets of questions were employed. One set (i.e., Questionnaire S1) was prepared for the advisers (agronomists and accountants), and the other set (i.e., Questionnaire S2) was used as a basis for interviews with farmers. The interviews in both cases were conducted via telephone, due to the COVID-19 pandemic restrictions.

Each of the participating advisers was asked seventeen open-ended questions in a semi-structured format. These questions addressed their personal characteristics, their experiences and exchanges with farmers, as well as their attitudes and understanding of the concepts of planning and control methods and the actual use of such methods by farmers. The questions examined the frequency and type of methods used, the relationship of these methods to sustainability, and finally the attitudes and perceptions of advisers for the steps that were necessary to adopt and implement more rigorous planning and control methods. The interviews were recorded with the permission of the participants, transcribed verbatim, and translated into English. These interviews took place between the 6 January and the 8 February 2022, with each interview taking an average of 20 min. All respondents consented to the data generated to be used for research purposes.

Each of the participating farmers was asked twenty-one open-ended questions in a semi-structured format. These questions addressed their personal characteristics and farm business related information, and then asked about the implementation of planning and control methods. During the interviews farmers were asked about their confidence and experience of implementing planning and control methods, the types of methods already used, their relation to sustainability, the risks incurred because of non-adoption and implementation, the types of advisers they made use of, and finally the extent to which they used the services provided by advisers. The interviews were recorded with the permission of the participants, transcribed verbatim, and translated into English. These interviews took place between the 22 January and the 15 February 2022, with each interview taking 15 min on average. Farmers consented to the data generated to be used for research purposes.

2.5. Data Analysis

2.5.1. Content Analysis

The participant responses were analyzed using content analysis. The aim of the analysis was to produce replicable and valid inferences from the interview texts [32]. This method was selected because content analysis allows the researcher to quantify and analyze the presence, meanings, and relationships of such certain words, themes, or concepts. It enables the researcher to understand the aspects of a phenomenon, and identify and analyze patterns and attitudes within a given data set [33]. Thus, content analysis is a research method that provides a systematic and objective means to make valid inferences from verbal, visual, or written data to describe and quantify specific phenomena [34]. According to [35], the processes needed to organize the content analysis, in a linear fashion, are unitizing the words, sentences, and paragraphs, sampling to obtain a manageable subset, recording/coding to create durable records, reducing the diversity of text to what matters, inferring contextual phenomena from texts, and narrating the answers so that the results are comprehensible to others.

In this study inductive content analysis was used, as it is a more exploratory approach. Through the study of the recorded interviews, key themes were identified that emerged from repeated examination and comparison of the raw data. NVivo 12 software aided the data analysis and the distinguishing of segments of texts. Because of the rich verbatim transcriptions provided by the participants, segments of texts were distinguished solely based on what the participants reported. No attempt was made to theorize or interpret interview replies. Coding (creation of the nodes) and word frequency measurements were used to analyze the interview texts. Coding was used to understand how these key themes emerged, and word frequency was used to quantify the appearance of these words next to the concepts under study. The interviews were conducted in Greek and were transcribed and entered in NVivo 12 software. The creation of the themes (nodes) during the process of coding and word frequency measurements were performed in English, for the purposes of the analysis.

2.5.2. FADN Data

As well as aiding in the identification of the study sample, the FADN data were used to inform and generate results for the social and economic elements of the 28 farm businesses in the study. The Greek Ministry of Rural Development and Food provided data on specific features of the farm businesses taking part in the sample: holding size, crop type, expenses, profits, and subsidies. These, when combined with the findings from the content analysis, gave a clearer image of the specificities and characteristics of the farms and how the opinions and perceptions of their owners were formed.

3. Results and Discussion

3.1. General Characteristics

The general characteristics of the farmers in the sample compared to regional data are shown in Table 1:

Table 1. Sample data adapted from FADN and Peloponnese data [36].

	Sample		**Peloponnese Data**	
Gender	85% male		75% male	
Type of farming	82% conventional		90% conventional	
Age	85% > 40 years		75% > 40 years	
Holding size (ha)	Mean 7.2 ha	82% < 10 ha	Mean 6.6 ha	93% < 10 ha
Education	80% primary and secondary		95% primary and secondary	

Most farmers in the sample cultivate citrus crops, mainly orange trees (Citrus sinensis), mandarin trees (Citrus reticulata), and lemon trees (Citrus limon), as well as olive trees (Olea europaea) for oil production along with varieties of table olives. Other crops grown on smaller areas were apricots, vine, vegetables, and pomegranates. One of the participants was farming sheep for dairy and meat production, although they also produced olive oil. Table 2 provides a broad characterization of the 28 farms under study.

The agronomists were all male, which is also the case in the wider region. In the case of accountants, there were a number of female respondents (30%) which is also reflected in the wider region. The age of the majority of the participants was between 40 and 59 years with at least 10 years of experience.

Table 2. Selected sample from FADN Greece. Adapted from FADN dataset Greece.

Interviewee ID	Type of Farming	Holding Size (ha)	Crops
Farm1	Conventional	3.55	Citrus, Olive, Apricot trees
Farm2	Conventional	4.4	Citrus, Olive trees
Farm3	Conventional	8	Citrus, Apricot trees
Farm4	Conventional	8.46	Citrus, Olive, Apricot trees & Vine (Wine)
Farm5	Conventional	12.75	Citrus, Olive, Apricot trees
Farm6	Conventional	8.93	Citrus, Olive trees & Vegetables
Farm7	Organic	6.05	Citrus, Olive trees & Vegetables
Farm8	Organic	22	Olive trees
Farm9	Conventional	7.8	Citrus, Olive, Apricot trees
Farm10	Conventional	6.7	Citrus, Olive, Apricot, Peach trees
Farm11	Conventional	4.2	Citrus, Olive trees
Farm12	Conventional	10.39	Citrus, Olive trees
Farm13	Mix	9.81	Citrus, Apricot trees
Farm14	Conventional	7.25	Olive, Apricot trees & Vine (Wine)
Farm15	Conventional	6.07	Citrus, Olive, Apricot trees
Farm16	Conventional	16.8	Citrus, Olive, Apricot trees
Farm17	Organic	2.95	Citrus, Olive trees
Farm18	Conventional	6.9	Citrus trees
Farm19	Conventional	4.6	Citrus, Olive trees
Farm20	Organic	7.03	Citrus trees & Vine (Wine)
Farm21	Conventional	1.4	Citrus, Olive trees
Farm22	Conventional	3.1	Citrus, Olive, Pomegranate trees
Farm23	Conventional	1.75	Citrus, Olive trees & Vegetables
Farm24	Conventional	3	Citrus, Olive trees
Farm25	Conventional	9.03	Citrus, Olive trees
Farm26	Conventional	3.58	Citrus, Olive, Apricot trees
Farm27	Conventional	14	Olive trees, Pastureland & Sheep
Farm28	Conventional	2.4	Citrus, Apricots trees

3.2. Research Findings

Table 3 provides a quantitative overview of the main research findings.

Further analysis of the summary findings from Table 3 is presented below with the discussion incorporating relevant literature.

Table 3. Key themes of the content analysis and information drawn from respondents.

A/A	KEY THEME	FARMERS	ADVISERS	
			Agronomists	**Accountants**
1	**Planning in agriculture**	100% of 736 farmers agreed on the importance of planning in agriculture.	100% of agronomists agreed on the importance of planning in agriculture. Main focus was agricultural practices, timely application of them to reduce costs, mitigation of climate change, and improvement of quality and yields of produce.	100% of accountants agreed on the importance of planning in agriculture. Main focus was economic benefits, tax avoidance, insurance, investments, business growth, and development.

Table 3. *Cont.*

A/A	KEY THEME	FARMERS	ADVISERS	
			Agronomists	**Accountants**
2	**Use of planning methods**	93% of farmers use planning methods, while 7% do not. Challenges were related to weather conditions, prices, inputs costs, and agricultural practices.	70% of agronomists think the use of planning methods offers benefits. 90% of agronomists consider their use also presents challenges. 10% of agronomists think there are no challenges to the use of planning methods. Challenges were related to age, culture, reluctance to change, education, size of holding, and benefits with labour organisation, agricultural practices, and crop restructuring.	50% of accountants think the use of planning methods offers benefits. 80% of accountants consider their use also presents challenges. 20% of agronomists think there are no challenges with the use of planning methods. Challenges have to do with lack of education, part-time employment, age, holding size, and mentality, and benefits with timely anticipation of situations, production reducing costs, etc.
3	**Planning and sustainability**	93% of farmers consider planning in relation to farm sustainability as important, while 7% consider that it does not affect sustainability at all.	100% of agronomists consider planning in relation to farm sustainability as important. 80% focused on financial issues, while 20% showed a more holistic understanding of sustainability.	100% of accountants consider planning in relation to farm sustainability as important. 90% focused on financial issues, while 10% showed a more holistic understanding of sustainability.
4	**Control in agriculture**	100% of farmers agreed on the importance of control in agriculture.	100% of agronomists agreed on the importance of control in agriculture. The word that prevailed was "important", followed by words such as improvement, evaluation, previous years, prevention, analysis, results, and action.	100% of accountants agreed on the importance of control in agriculture. "Important" was the most featured word here too, followed by avoid tax, taxes, agricultural practices, education, and part-time employed.
5	**Use of control methods**	96.5% of farmers use control methods, while 3.5% do not. Challenges mainly consist of economic issues, input costs, and prices.	30% of agronomists think the use of control methods offers benefits. 70% of agronomists consider their use also presents challenges. Challenges were related to age, approach to profession, reluctance to change, and economic reasons.	30% of accountants think the use of control methods offers benefits. 80% of accountants consider their use also presents challenges. Challenges were related to age, education, and reluctance to change.
6	**Control and sustainability**	89.5% of farmers consider control in relation to farm sustainability as important. 7% consider that it does not affect sustainability at all. 3.5% are not sure about it.	100% of agronomists consider control in relation to farm sustainability as important. 100% focused on financial issues such as better prices, reduction of costs, and trading prices.	100% of accountants consider control in relation to farm sustainability as important. 100% focused on financial issues such as revenue-income and profit.
7	**Advice common subjects**	46% Agrochemicals (fertilizers, spraying) 39% Agricultural practices 18% Plant protection 18% Tax issues	90% Plant protection and nutrition 30% New varieties 30% Irrigation 30% Yield increase 10% CAP subsidies	90% Taxation issues 30% National insurance 10% Investments 10% Financial situation of the business

Table 3. *Cont.*

A/A	KEY THEME	FARMERS	ADVISERS	
			Agronomists	**Accountants**
8	**DST use to inform decision-making**		70% Yes 30% No	100% Yes
9	**DST farmers' stance**		80% Positive 20% Neutral/Varied depending on age, size of holding, cost/benefit balance	50% Positive 30% Negative due to age and ease of use 20% Neutral due to culture
10	**DST steps forward**		60% State intervention 50% Cost of use 40% Team organization of farmers 30% Applied research	60% Training/education 50% State intervention 30% Change of mentality/extroversion 30% Cost of use

3.2.1. Factors Influencing Planning and Use of Control Methods

The participants have highlighted how useful engagement with the function of planning has been for their agri-businesses. Particularly, it was noted how it had contributed to developing contingency plans for challenges that would otherwise have emerged during the production and harvest period, such as diseases, drought, and limited access to and cost variability in the production inputs. When considering irrigation and water use efficiency and the risk of drought in the region of Argolida, and extending this to the Mediterranean basin, contingency plans are of paramount importance [37].

For farmers, the function of planning was mainly associated with and considered important for guiding decision making about agricultural and agronomic practices for next year's production period. Thus, influencing the short-term decision making and farm management, rather than the long-term strategic planning of the agribusiness [38]. Financial aspects associated with the function of business planning received less attention from farmers. For instance, one of the farmers stated *"Financial planning cannot be done by the farmer, I think. It depends on . . . let me tell you, it's all about weather and you never know what's going to happen . . . "* In addition, although the function of planning is used to develop a coherent strategic longer-term plan for the agri-business [39], this was not reflected in the responses from farmers.

In comparison to farmers, advisers had a different perception of the importance and use of the management function of planning. Agronomists recognized the importance of planning beyond immediate agricultural practices, which could yield long-term benefits in production, costs, and eventually profit. Accountants prioritized the planning of economic factors of production to minimize tax and insurance payments.

A key difference amongst the farmers and agronomists was that the latter was considering the function of planning as a systematic process which was informed by science and data driven, while according to farmers, the whole process was designed and implemented *"in their head"* (this is an expression meaning that the plan was devised in an offhand way and without it being written down somewhere). For farmers, the implementation of the production plan depended on multiple parameters such as tradition, experience, weather, and economic ability, rather than on documented evidence-based recommendations from the adviser or based on data from past years, or indeed data relating to future scenarios. Their planning process stems solely from the fact that they schedule agricultural practices without any, or limited reference to, financial planning. However, it must be argued that business planning and benchmarking of the performance of the farm business and the individual enterprises can improve financial performance and thus enhance long-term economic sustainability [40]. In the case of the accountants, the plan and the advice pro-

vided usually had a binding character and effect, being based on legislation, with clear and distinct time boundaries and being linked to actual financial data.

Of equal importance to the function of planning, all groups suggested that monitoring and controlling the agribusiness to attain its objectives was also of high importance. Whereas the planning process was seen as being focused on short term agricultural practice (with constant reference to cultivation practices, plant protection, irrigation, and fertilization), the monitor and control process was almost exclusively related to financial parameters. Responses suggest they did not evaluate the effect of their practice on production but assessed only its economic dimension.

The majority of the farm businesses in the sample (70%) had been managed directly by the farm owner, whereas for the other 30% of businesses family members, employees or agronomists had some involvement in the planning, design, and implementation. The reported rate of adoption and implementation of planning methods was over 90% of the farm businesses surveyed, whilst just two farms suggested they had not used any kind of planning method. In two cases the function of planning was undertaken by the agronomist or a family member without the active participation and engagement of the farmer, who just implemented instructions given. Based on the responses received from all groups, planning was associated with *"designing agricultural practices"* like *"spraying, pruning, irrigation, applying fertilizers"* and *"establishing new varieties"* (Figure 2).

Figure 2. Planning process-word cloud. Taken from N-VIVO analysis.

The challenges encountered during the planning process, as mentioned by the farmers, were:

- The weather conditions, which are unstable and unpredictable.
- The variability of input prices, which makes it harder to perform agricultural practices in the intended way and increases production costs while simultaneously reducing gross margin.
- Lack of access to required credit which limited the farmers' ability to perform necessary actions.
- Water scarcity, part-time employment, and the general difficulty of covering the labour requirements were also cited.

While for advisers, the challenges were:

- The changing climatic conditions, especially more recent unpredictability of weather conditions.
- The culture and lack of attention of farmers towards their business development.
- Related to the above, the unrealized potential to increase profit margins via better cost management and increase of yields.

3.2.2. Features of Planning and Control

Features that emerged during the content analysis could be attributed to the adoption and implementation of planning and control methods by farmers and their advisers, and are presented in Table 4.

Table 4. Features of planning and control identified from the content analysis *.

	FEATURES
AP	Agricultural Practices
FI	Financial
CR	Crop Restructuring
TR	Trading
IN	Investments

* (Agricultural Practices: All cultivation processes such as fertilization, irrigation, etc. Financial: All financial statements and budgets such as cash flow budget, enterprise gross margins, etc. Crop Restructuring: Changes in varieties and crops. Trading: Sales and prices of produce. Investment: Investments in machinery, land purchase, etc.).

These features emerged from the discussion with farmers, and at least one of the features was mentioned by each respondent whilst some mentioned more than one and up to five (all of them). If a farmer is able to plan or control for all five features, then that would cover the operational, tactical, and strategic goals of the business as described in [9] and result in well-informed and evidence-based decision-making, thus enhancing the sustainability performance of the farm business.

From the perspective of advisers, planning was considered a crucial parameter for the success of the farm business. For instance, one adviser noted, *"I think, especially in the current period, if you don't do proper planning there is a chance that your farm business will go bankrupt"*. Agronomists emphasized that the increasing unpredictability of the weather conditions affected the outcome of the planning process. This increasing weather variation suggests that planning is more important in order to mitigate risks, and in preparation of timely response to changing circumstances.

Control methods were also found to be important to both agronomists and accountants. All agreed that it was crucial to monitor and keep records of previous years as a basis on which to plan for following years. For accountants, their advice and guidance were focused and limited to avoiding over taxation, although they generally avoided advising on the financial management of the crops and the farming system. Agronomists were more holistic in their approach, noting that the function of monitoring and controlling was necessary for the improvement of the business, as it would help farmers to avoid difficulties and to mitigate risk. The control function allowed farmers to develop a well-informed strategic pathway that was based on information and feedback to form the control process. This enabled the businesses to attain their production output and sales goals. Farmers generally discussed their production data with the agronomists so that potential changes could be made. Nevertheless, the main feature of the control process was related to economic data, meaning that the control process primarily encompassed its use at the end of the year rather than monitoring data from the crops throughout the year.

Accountants were not asked by farmers to advise on business control, i.e., farmers did not consider their accountants as an adviser in the context of providing management advice. Some agronomists suggested that farmers had an *"amateur approach towards the profession and their businesses"*. This may be a result of lack of training and education, as according to [41], only 4.5% of farmers had attended at least one training course on agricultural-related subjects and fewer have graduated from agriculture and closely related education, or lack of direction from the State. Another reason may have been the lack of an organised approach from the advisers. It is possible that increased knowledge of available DST could stimulate farmers to make use of them. According to one agronomist

"An organised approach would benefit not only the farmers but also my colleagues themselves as a lot of them have no idea what a tool like that can offer them".

Agronomists tended to strike a balance between both production and financial aspects, taking into consideration the economic outcome of the previous year if available, along with data on the results of the application of agrochemicals, fertilizers, irrigation, etc. Accountants continually accumulated data on the farmer's economic activity in order to bring it under firmer control: they may suggest an investment or any other kind of action to mitigate the regularly recurring tax and insurance burdens.

From the farmer's perspective the benefits of planning and control methods are the prediction, development, motivation, and anticipation of unprecedented situations. However, structural issues in the agricultural sector in Argolida and the wider Mediterranean basin provide specific challenges to the adoption and implementation of planning and control methods by farmers. These challenges, as noted in this research are:

- The ageing rural population.
- Farmers' lack of vocational training.
- Limited access to information and advisers.
- Rural culture and traditions that continue to influence agricultural practices.
- The small size of the holdings and their distributed nature.
- The poorly- informed management approach of farmers.

As one of the advisers noted...., *"they cultivate as they did 20 years ago and as long as they can sell their produce it's ok"*. This summarizes the overall approach that many Argolida farmers have towards their businesses. For instance, although the area is designated as a nitrate vulnerable zone (NVZ) with the intensive agricultural activities (high fertilizer usage) and the over-abstraction of groundwater having a direct impact in water availability and quality, none of the respondents noted these as factors that restrict their daily practices. That can be attributed either to lack of knowledge or to the negative view that farmers have towards the NVZ, often viewing the restrictions as too inflexible [42].

Such challenges have been documented in the Mediterranean region previously, as [43] has talked about the agricultural population and the ageing problem in the area, while many more have referred to the lack of vocational training for farmers [15,44] and advisers [45]. This research shows that the application of planning and control tends to be either completely lacking or very restricted in its scope and can be linked to reduced economic performance [26]. Nevertheless, it is also a feature that aligns with the notion that the process of planning and controlling has an iterative character and depends clearly on the needs and requirements of the observer [46].

Overall, according to advisers, planning and control in the Argolida area was deficient mainly because of the farmers' attitude toward management techniques. Planning and control methods were employed informally and tentatively. Farmers' limited use of planning and control tools for financial management decision-making did not only originate from a lack of understanding about these formal tools, but also from farmers not finding them particularly useful [47]. This affects the development of farm businesses in the area under study and similar areas in the Mediterranean region.

Planning and control methods should be employed by the farmer/adviser in order to control factors of the external environment, having access to and making use of knowledge and information. In their work [47] refers to it too. In terms of strategic planning, although the results of the content analysis reveal low numbers of farmers implementing methods to support it, as population increases and society is evolving with increased environmental and social pressures, farm businesses must adapt in order to survive [48]. In such a volatile area in terms of natural, economic, and political issues [49], the need to consider planning and control is compelling. Nevertheless, the lack of clear mission and vision from farmers compromises the form of any coherent strategic planning at the farm level, which is also evident in the findings of [26] in their research.

For the agricultural systems of the Argolida region to evolve in a more sustainable manner, this research suggests there is a need for policy making to encourage the informed

use of planning and control methods on farms. A greater sustainability orientation of the farming systems in the region requires improved planning (either operational and tactical or strategic) and control in order to ensure their future viability.

3.2.3. Advisers' Perspectives of Sustainability and the Challenges Involved

Advisers acting as private extension officers play a key role as a critical link within farming populations in shaping the behaviour and attitudes of farmers [50]. Essentially, the role of advisers is to ensure interaction with farmers in the context of problem solving and involves tasks and activities that have to do with the use of communication skills to stimulate and enable change [51]. In this research agronomists and accountants were a critical source of information and advice for the owners/managers of the farm businesses, from practical subjects such as agricultural practices, tax, and insurance to more complex concepts like sustainability. For instance, one adviser noted *"If proper planning is not implemented, sooner or later the farm will collapse. In other words, the products will be sold at prices lower than the cost, so the financial sustainability of the farm, cannot be guaranteed if this is not done. Environmentally, climate change is now very intense, and this factor should also be considered in planning"*.

Although the majority of the farmers in the sample (over 90%) highlighted the importance of planning and control methods in relation to farm sustainability, only few considered the term in a holistic manner, and fewer still implemented robust planning and control. Many of the respondents simply linked sustainability to the economic prosperity of the farm business, while others linked it to the accurate scheduling of the agricultural practices to guarantee the quality and quantity of their produce. This demonstrates the constrained view of the Argolida farmers in relation to sustainability and highlights that their decision making is primarily based on the economic sustainability of the business. Thus, they only perceive one dimension of sustainability in their decision making and they generally ignore the environmental and social pillars.

Return on investment was the main motivation behind farmer decision making, and statements such as "budgeting is unrealistic, because of rising prices of inputs" and "I trade my produce in open markets so I try to produce as high-quality products as I can" re-enforced the perception that sustainability awareness was low. The scant appearance of statements about high-quality products possibly stems from the fact that trade arrangements for the produce are mainly characterized by bulk sales to processing and packaging units in the area, thus having an impact on the targeted quality of the products, since producers will aim for high volume and low quality. For example, in the case of oranges due to market specific features, produce for export and produce for juicing (lower quality) enjoy in a lot of cases comparable low selling prices. There was a small number of organic farmers (12%) that considered sustainability more holistically. They linked the future prospect of their businesses to management consistency, good organizational structure, machinery and technology usage, and environmental and societal challenges awareness.

Advisers stressed the importance of planning and control methods to the sustainability of farm businesses, but generally focused on economic performance which was linked to profitability and productivity. Their responses indicate that there is a gap in the understanding of wider sustainability issues. Reduced production costs and increased prices and profits were the main benefits perceived from improving the economic performance of the business and thus, the pillar of economic sustainability. The environmental and social pillars were just mentioned by a few (12%), but without any further comments on how these could be affected using a systematic approach to planning and control methods.

This convention of focusing primarily on the economic performance probably explains the interaction between farmers and advisers in terms of the advice given, the advice used, and opinions about the services provided. The interviewees gave thought-provoking responses to the questions about the advice and the adviser. Farmers frequently named agronomists as their advisers, while a minority (10%) of the respondents considered accountants in that capacity, showing an issue of interpersonal trust between them [52]. There

are two main reasons for that happening. First, the knowledge and skills of the agronomists are more familiar to the farmers as they have a relationship with it, founded on theory and practice [53]. An influencer with a common background (farming) will likely be more effective at influencing, as trust is partly based on experience and occupation as an element of "professional" trust [54,55]. Secondly, they considered the advice of the accountant mainly in the context of tax advice for the farm business, relating to legal and legislative requirements. They do not consider the advice of accountants as a form of management advice that can determine the farm's current state, identify the economic outcomes, and establish the participation of each enterprise in the total income; elements that can lead to informed, customized decisions towards the management for sustainable development are also mentioned by [56] in their work. The lack of understanding of the financial management processes, as well as effective learning and practice change facilitation by farmers are factors that hinder the adoption of advisory services from accountants. It has also been highlighted from previous work that accountants were more likely to be trusted and considered for business advice if producers consider the accountant capable of providing statutory services [57]. This passive attitude towards financial management not being central to farmers' culture compared to other technical farming practices has been also mentioned in other studies [58].

The responses of the agronomists about the role of planning and control methods were mainly focused on securing better prices for products and the reduction of production costs. A small proportion of advisers (around 10%) mentioned climate change and depletion of natural resources (water) as factors that businesses needed to consider in their planning strategy. They also recognized that there were economic (increased production costs, low prices, smaller profit margins) and social (land abandonment, ageing rural population, lack of young people entering the sector) changes in agriculture which would impact farm businesses. The consensus was that the adoption of planning methods is an organised process leading to economically sound cultivation with better prices and trading.

Accountants' perception of the role that planning and control methods had on the performance of the farm business was different. They suggested that the main outcome would be business benefits in terms of economic viability and future business development opportunities. Just one accountant referred to the benefits as economic, environmental, and social, thus suggesting a more holistic understanding of sustainability. According to agronomists, in order to obtain the benefits associated with economic security, environmental soundness and social coherence, farmers need to change their orientation, i.e., the challenge that has to be overcome is that policy-makers and consumers were increasingly concerned about the sustainability of food production, the environment, and rural society, whilst the farmers themselves are still focused primarily on financial sustainability. They stated that changing attitudes, training, and education of both farmers and many of the advisers would be necessary in order to instigate developmental change. For instance, most accountants considered that farm business development could be measured in monetary benefit alone. There was also the suggestion that larger holdings were key to development, as they had greater bargaining power due to production volume and could thus command higher prices.

The gap in the understanding of wider sustainability issues within the context of farm decision-making, management efficiency, and effectiveness emerging from the responses amongst farmers is also confirmed by [59]. As [22] suggests, the exclusive pursuit of economic goals makes farmers resistant to change, while more outward-looking behaviours are linked to higher adoption rates of sustainable farming practices.

The subjects of advice are totally justified by the scientific expertise of each category of adviser. The question here is whether the advice goes beyond necessary instructions about agrochemicals and fertilizers [44] and extends to guiding the decision-making process towards choosing a more sustainable way of farming. The fact that agronomists tend to act more like traders than advisers endangers the integrity and quality of private extension services, and this is not only their fault. One of the agronomists interviewed noted *"we do*

not always have all the means to fight, and we do not have the methods to lead the farmer. We are not always precise in our advisory role because agriculture changes year by year and we cannot easily follow these changes, there is no research program in Greece that supports and helps us in this".

The new CAP aims to encourage the agriculture sector to be more dynamic, competitive, and effective [60]. However, the advisers suggested that although seminars and workshops of private companies promoting new agrochemicals or fertilizers do take place, there are no meetings organised by the Ministry or the respective directorate of rural development to inform them about the national and European vision of stimulating sustainable agriculture [60]. This lack of interaction between farmers and advisers in the form of private extension services suggests there may be the opportunity to develop a co-production model of services [61]. Such an approach recognizes that farmers are collaborating actors and not clients, and would enable a co-design platform where extension services, public or private, and farmers work collaboratively towards a sustainable future.

3.2.4. Decision Support Tools [DST] Current Situation and Future Prospects

This research has highlighted that the use of more effective planning and control could improve the decision-making process of farmers, leading to better business outcomes and a more sustainable way of farming, similarly to the work of [62]. DST could provide a means through which more sustainable methods could be adopted and implemented more efficiently and effectively in farm businesses as mentioned by [63], too. On this basis, advisers were asked their views on the current usage of DST by themselves and the farmers. Advisers were also asked to reflect on farmers' attitudes towards the use of DST and what strategies to follow to encourage their use and adoption amongst farmers.

In relation to the use of DST there was a difference between agronomists and accountants. Of the former, 70% answered that they used some type of DST to inform their decision-making and advice to farmers. DST applications included soil analyses, planning fertilization patterns, and weather stations to programme applications for plant protection; they also used more complex devices and applications such as drones with smart spraying machinery, sensors for humidity, and applications for map plotting for plant protection and soil humidity recording. The remaining 30% stated that they did not use DST. The software programs used by the accountants were focused on calculation of taxes and other accounting services. These can be classified as DST, although their only purpose is to inform the farmers' decision-making process on accounting matters.

Advisers suggested that the key challenges to be addressed in order to promote DST use by farmers were the cost of owning and using a DST, as well as the education level, age, and openness to the use of new technology. In addition, [64] has suggested that farmers' attitudes toward the use of DST has changed over recent years, as they have become more closely acquainted with technology and receptive to systems of objectively relevant and sound information. In this research, accountants suggested that the farmers' stance towards the use of DST had gradually improved, although there are still considerable further opportunities for their use. Reluctance to use DST appears to be greater among those aged over 60 years old. Some farmers are still lacking interest in DST and do not have the technological know-how to use these systems or interpret the outputs from them. It has been suggested that the provision of tools that have greater transparency and ease of use could motivate hitherto unwilling farmers to support this innovation. Similar findings are mentioned by [63] in their work.

Agronomists saw farmers adopting a positive attitude to some DST, but there were still some issues that needed to be addressed to achieve greater acceptance. Their experience from the use of DST suggests that they are acceptable to farmers if they are evidence-based. Establishment costs of DST, the lack of subsidies for such kinds of technology, the absence of state guidance and infrastructure, the lack of training and education, and the absence of outward-looking cultural attitudes to innovation are challenges that need to be addressed if the use of DST is to be fully embraced by farmers. Consequently, agronomists and accountants agreed that state intervention for the promotion of DST and subsidization of

the establishment cost, along with training for their use, would provide the best mechanisms to encourage uptake. They also emphasized the importance of encouraging a change in the farmers' attitude towards a more contemporary and sustainability-oriented way of farming.

Agronomists also stressed the absence of research programmes on sustainable or precision agriculture that were accessible to advisers and/or farmers in the region. They also noted the need for farmers to form groups to capitalize on the advantages of their common use of inputs, machinery, and technology, and on their combined bargaining power over their sales of produce. In addition, accountants focused on the enhancement of the information flow and the creation of local workshops and seminars that could increase the acceptance of DST, particularly among ageing, less educated, and traditional farmers. Accountants' DST consist of software programmes that non-professionals find hard to use. This suggests the need for a corresponding transparent, and perhaps farmer friendly, DST to provide the farmer with an informative image of the farm's current or future economic situation.

Agronomists seem to promote DST uptake, but the promotion always comes through a private company that the farmer doesn't know, doesn't trust, or fears as a potential source of hidden costs. The result is that the promotion effort is finding considerable resistance among farmers.

The usefulness of DST uptake that could incorporate planning and control methods, along with other necessary management attributes for the farm business, would be proven, if, along with the identification of the needs and requirements of users, there was a way to fit DST into farmers' practices. Ref. [65] refers to it in their work, that it should be done in such a way that it would be coordinated with their experienced-based local knowledge. Inevitably, there are challenges that need to be overcome in order to achieve better results. The challenges mentioned earlier have also been described by [65]. They note one feature which is described in their paper as habit, which has been referred to herein as culture, tradition, and established practice and is a characteristic that needs to be addressed with caution. Farmers' unwillingness to change and reluctance to adopt technical innovations and upgrades is totally justified by the surrounding environment. This research suggests that the absence of continuing vocational educational programmes for farmers, and advisers that lack training workshops and seminars for farmers, when combined with limited guidance from the state on the agricultural policy followed at national or regional level, shape an environment that stifles innovation uptake, technological upgrade, and/or sustainable development of farming. Similar findings have been reported by others [42,66,67].

4. Conclusions

Mediterranean agriculture is facing a range of challenges due to the interplay of many factors. These include a reliance on traditional agricultural practices, climate change, the spatial distribution and size of holdings, an ageing rural population, and environmental and social pressure to address key concerns of sustainability. This research provides an improved understanding of the factors that enable or hinder farmers and advisers with respect to the adoption and implementation of planning and control methods to inform the agricultural decision-making process. The incentives and the difficulties associated with changes required to evolve towards more sustainable farming systems are identified. This evolution to more sustainable systems also present advisers with challenges that go beyond the more traditional focus on productivity and profitability. Finally, in considering future sustainability improvements, the research outlines the attitude of farmers and advisers towards DST on the current situation and considers future prospects in the context of DST uptake.

This investigation of adoption and implementation of planning and control methods outlines the inherent challenges faced by farmers and advisers as part of their management approach, and suggests strategies through which the agricultural sector can overcome these challenges. These include the efficiency and effectiveness of current management

practices, the similarities and differences in behaviour between farmers and/or advisers, and potential mechanisms that may aid the evolution toward more sustainable systems.

In summary there are two key take-home messages for farmers and advisers in the region of the Mediterranean basin:

First, there is a need to enhance the managerial competencies of farmers which will facilitate an improvement in their farm businesses. Farmers would benefit from the systematic use of planning and control methods as a tool that will lead them to a more sustainable way of farming. The adoption of such methods can provide a pathway for farm advisers and farm owners/managers to reduce business risk and improve management efficiency and effectiveness.

Secondly, advisers must incorporate in their perspective the ultimate goal of sustainable agriculture for the region. Continuous vocational training on sustainable development of agriculture, technological innovation, and change of behaviour from a sales-oriented approach to a more advisory role can offer the farmer, who is the final recipient of all the guidance and necessary parameters required to change his/her way of farming accordingly.

A potential positive next step in terms of research would be the engagement of farmers, advisers, extension officers, industry representatives, and policy-makers in a co-production approach to define needs and requirements of farmers and advisers in DST that can improve the sustainability of farming systems in the area.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/agriculture13020450/s1, Questionnaire Advisers, Questionnaire Farmers.

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