An electronic platform for farm accounting and decision making*

Anna Tafidou[1,*,†], Evgenia Lialia[2,†], Asimina Kouriati[2,†], Eleni Dimitriadou[2,†], Christina Moulogianni[2,†], Angelos Prentzas[2,†], Thomas Bournaris[2,†] and Georgios Kountios[3,†]

[1] *Department of Mathematics, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece*
[2] *Department of Agricultural Economics, Aristotle University of Thessaloniki, 54124, Thessaloniki, Greece*
[3] *Department of Agriculture, International Hellenic University, Sindos, 57400 Thessaloniki, Greece*

Abstract

In the contemporary agricultural landscape, efficient management of agricultural holdings necessitates the integration of technical and economic data. This paper introduces an electronic platform that integrates data monitoring to meet the demands of modern agricultural practices. The platform offers a comprehensive solution, enabling farmers and stakeholders to collect, analyze, and utilize both technical and economic information. Through the utilization of modern technology, the platform provides user-friendly data input, processing, and visualization. It encompasses various features, including real-time monitoring of crop growth parameters, yield estimations, resource utilization, and financial performance indicators. Furthermore, the platform is designed to promote interoperability, allowing integration with existing agricultural management systems and data sources. This interoperability enhances the scalability and adaptability of the platform, ensuring its relevance across diverse agricultural contexts. By providing a unified solution for the integrated monitoring of technical and economic data, our electronic platform empowers agricultural stakeholders with the tools necessary for optimized resource management, increased productivity, and sustainable agricultural development. This paper presents the development, functionalities, and potential applications of the electronic platform, underscoring its significance in advancing agricultural practices towards greater efficiency and sustainability.

Keywords

Electronic platform, technical and economic data, farm accounting, decision making

1. Introduction

Agriculture emerges as a sector that greatly benefits from the advancement of innovative technologies [1]. In an ever-evolving world, the European Union plays a central role in promoting research and development within the agricultural sector. Through investments in innovation programs and supportive policies for technology adoption, the EU has significantly bolstered the sector's advancement [2,3].

Many farmers find it difficult to understand accounting information and cannot use it effectively. Research has proven that the use of accounting software helps to increase the profitability of agricultural holdings. Over time, accounting is essential for obtaining strategic data. Many farmers choose to hire accountants to get reliable advice to help them through the receiving process.

* *Short Paper Proceedings, Volume I of the 11th International Conference on Information and Communication Technologies in Agriculture, Food & Environment (HAICTA 2024), Karlovasi, Samos, Greece, 17-20 October 2024.*
* Corresponding author.
† These authors contributed equally.
atafi@agro.auth.gr (A. Tafidou); evlialia@agro.auth.gr (E. Lialia); kouriata@agro.auth.gr (A. Kouriati); edimitri@agro.auth.gr (E. Dimitriadou); kristin@agro.auth.gr (C. Moulogiani); aprentzas@agro.auth.gr (A. Prentzas); tbournar@agro.auth.gr (T. Bournaris); gkountios@gmail.com (G. Kountios)
0009-0001-9523-6993 (A. Tafidou); 0009-0000-4844-483X (E. Lialia); 0000-0002-4306-8553 (A. Kouriati); 0000-0002-7363-0703 (E. Dimitriadou); 0000-0002-1364-4214 (C. Moulogiani); 0000-0002-4157-7418 (A. Prentzas); 0000-0001-9540-7265 (T. Bournaris); 0000-0003-1957-5616 (G. Kountios)

Accountants ought to utilize data-driven technological advancements more extensively, harnessing this data to elevate strategic decision-making capabilities. [4,5].

The incorporation of new technologies in agriculture is described as the fourth agricultural revolution [1]. Within the broader scope of this evolution, electronic platforms are playing an increasingly significant role in agriculture. These platforms provide farmers with information and tools that enable more efficient monitoring and management of their crops, leading to increased productivity and reduced operational costs [6]. At the heart of this development is the ongoing need for innovative solutions to address the challenges facing the agricultural sector, including adapting to new EU regulations aimed at environmental protection. Electronic platforms serve as a powerful tool in meeting these challenges.

This article introduces the electronic platform "Farm Economic Monitoring," which functions as a tool for overseeing each production sector of a farm. The creation of this platform aims to assist farmers in managing inputs and outputs for each growing season. The platform operates using data on the requirements of each production sector. It subsequently provides results related to income and offers information that aids in decision-making. [7].

2. Materials and Methods

The uniqueness of this project is evident in several ways. Initially, it is being implemented in the Region of Central Macedonia, with the goal of expanding it across Greece.

The primary purpose of the platform is to enable the active participation of producers in monitoring and managing the finances of their holdings. The "Farm Economic Monitoring" platform is built upon an existing structure from the Agricultural Informatics Laboratory within the Agricultural Economics sector of the Aristotle University of Thessaloniki. It is a crop monitoring platform that monitors each production sector separately. As indicated in the existing literature, such a platform does not currently exist [8], despite methodological applications [7]. At this juncture, it is important to note that accounting procedures play a crucial role in providing the necessary information for decision-making processes. They provide farm managers with the information and expertise needed to carry out crucial financial evaluations and pinpoint the advantages and disadvantages of the farm [9]. These farm accounting records can serve as indicators of progress and provide solutions for efficient management [10, 11]. These practices can also contribute to management focused on sustainable development. Several points in the literature emphasize the significance of farm accounting in the agricultural sector [9,10, 11, 12, 13, 14]. Considering all of the above, it should also be noted that this platform was designed to be accessible to many producers without financial burden. With its use, even producers in the most remote areas, who do not have easy access to transportation, are facilitated. It allows them to enter their crop data and monitor market conditions without needing to visit accounting offices for managing their finances and taxes. Furthermore, it enhances farm efficiency [15,16] through the monitoring of inputs and outputs.

The development of this platform unfolded in four stages. Initially, a license for the online platform was acquired. In the next stage, various tasks were carried out to create a beta application. Subsequently, the beta application was refined into an initial functional version, which was then piloted by members of three farmer groups in the vicinity of Thessaloniki. These farmers utilized the platform to identify errors in its current form and to emphasize additional functional customizations needed. Finally, based on the feedback from these user-farmers, the platform's final version was completed and is now hosted at the following link: https://fem.farmplanning.gr/. Upon entering the home page, it is necessary to create a profile and then select the year of registration of the information (Figure 1). The platform menu is divided into the entries part and the results part.

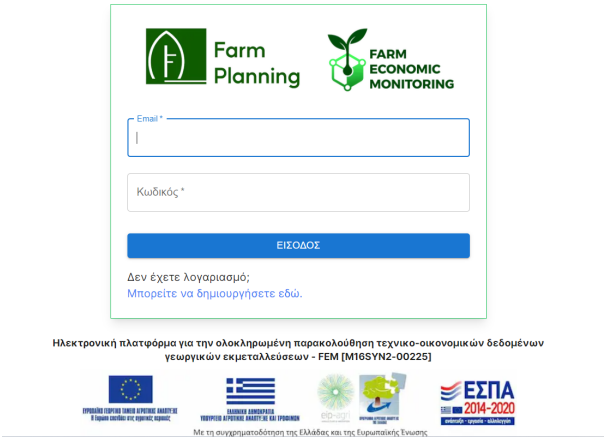

Figure 1: The Home Page of Farm Economic Monitoring

The registration section includes censuses, where information is recorded about production branches and parcels of land. It also includes an inventory of assets and loans for the selected growing season. At the same time, the entries section also includes diaries where daily work is recorded separately for each production branch. The final part of the entries includes incomes and expenses of the agricultural holding realized during the selected growing season (Figure 2).

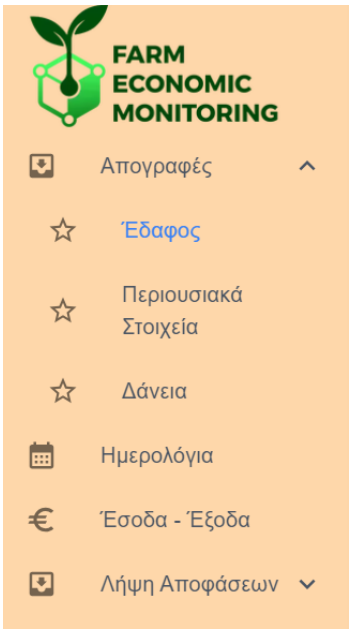

Figure 2: The Platform Menu of Farm Economic Monitoring

The data entered undergoes automatic processing, following the rules of agriculture, accounting, and assessment [17]. The results section is characterized by its focus on decision-making, as based on these results, producers can make the most rational decisions for their crops. By combining the entered information with the necessary formulas, each user can be informed about (Figure 3):

1. The capital structure of the holding
2. The technical and economic data of the production branches
3. The variable cost of production branches
4. The working hours of the production branches (human and mechanical)
5. The gross income
6. Production costs (divided into land, labor, and capital)

7. The financial results.

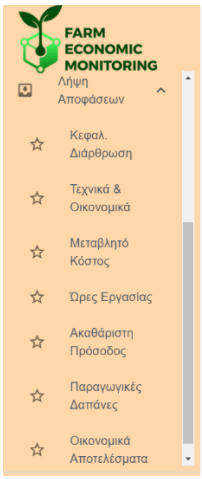

Figure 3: The Result Section of Farm Economic Monitoring

To obtain accurate results, data entry into the diaries should be done systematically. With the platform's assistance, it becomes possible to reduce production costs and adapt to new CAP measures, as technical and financial data can be easily reviewed through the results.

Overall, the project aims to effectively manage farm inputs and outputs, identify best practices, and optimize processes for greater efficiency. The new information provided by the platform contributes to informed decision-making, influences the operational activities of the farm, and generates new data for continuous improvement.

3. Conclusions

The electronic platform "Farm Economic Monitoring" has been developed with the primary goal of streamlining operations for farmers and supporting their modernization efforts. The platform features user-friendly interfaces designed to deliver crucial information for informed decision-making. One of its key functionalities is the capability to record and monitor different crops separately, providing detailed financial insights into each production branch. This feature enhances financial management and optimizes production planning by leveraging essential data.

Furthermore, the platform aids in compliance with the latest CAP (Common Agricultural Policy) regulations, thereby improving eligibility for subsidies and ultimately increasing revenues. However, a significant drawback of the platform is the continual need for upgrades to incorporate new tools and adjust to evolving regulations. Despite this challenge, the platform's flexibility enables ongoing adaptation to new technologies, ensuring its continued relevance and effectiveness over time.

Successful utilization of the platform necessitates users familiarizing themselves with its functionalities and comprehending the insights it provides. By doing so, farmers can maximize the benefits of enhanced financial control, streamlined operations, and improved compliance with agricultural regulations.

The "Farm Economic Monitoring" electronic platform represents a substantial advancement in agricultural management, providing farmers with a comprehensive toolkit to navigate the complexities of modern agriculture. In addition to its fundamental features of crop recording and financial monitoring, the platform acts as a centralized hub for integrating data-driven insights into operational strategies. By leveraging real-time data on crop yields, market trends, and financial performance, farmers can make proactive decisions that optimize efficiency and increase profitability. This proactive approach not only promotes sustainable farming practices but also enhances resilience against market fluctuations and regulatory changes. Moreover, the platform's capability to streamline compliance processes with CAP regulations highlights its crucial role in

securing subsidies and maximizing revenue streams. While continuous upgrades and adaptation to new technologies are essential, the platform's adaptability ensures ongoing support for farmers in optimizing productivity and striving for long-term success in agriculture.

Acknowledgements

This research was funded by the Rural Development Program (RDP) and is co-financed by the European Agricultural Fund for Rural Development (EAFRD) and Greece, grand number M16ΣΥΝ2-00225.

Declaration on Generative AI

The author(s) have not employed any Generative AI tools.

References

[1] M. Amiri-Zarandi, M. Hazrati Fard, S. Yousefinaghani, M. Kaviani, R. Dara, A Platform Approach to Smart Farm Information Processing. Agriculture. 2022; 12(6), pp. 838. doi: 10.3390/agriculture12060838.

[2] European Commission ,2022, Agriculture and Rural Development. URL: https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/cross-compliance_el

[3] B.C. Runck, A. Joglekar, K. Silverstein, C. Chan-Kang, P. Pardey, J.C. Wilgenbusch, Digital agriculture platforms: Driving data-enabled agricultural innovation in a world fraught with privacy and security concerns. Agronomy Journal 2022, 114, pp. 2635–2643. doi.: 10.1002/agj2.20873.

[4] J.L. Tingey-Holyoak, S.A. Wheeler, C. Seidl, Decision-making and resilience in agriculture: improving awareness of the role of accounting. Meditari Accountancy Research 2023, 31(6), pp. 1735-1756. doi :10.1108/medar-05-2022-1679.

[5] U. Gottlieb, H. Hansson, G. Johed, Institutionalised management accounting and control in farm businesses. Scandinavian Journal of Management 2021, 37(2), pp. 1-14. doi: 10.1016/j.scaman.2021.101153.

[6] A. Tafidou, A. Kouriati, E. Lialia, A. Prentzas, E. Dimitriadou, K. Tafidou, T. Bournaris, An electronic platform for the integrated monitoring of technical and economic data of farms, in Proceedings of the 17th International Conference of the Hellenic Association of Agricultural Economists (ETAGRO 2023), Thessaloniki, Greece, 02-03 November 2023.

[7] A. Kouriati, E. Dimitriadou, T. Bournaris, Farm accounting for farm decision making: a case study in Greece. Int. J. Sustainable Agricultural Management and Informatics 2021, 7, pp. 77 – 89. doi: 10.1504/ijsami.2021.116065.

[8] D. Mpoutakidis, A. Pavloudi, S. Aggelopoulos, M. Rapti, Development of Software for the Farms Accounting, in Proceedings of the 7th International Conference on Information and Communication Technologies in Agriculture, Food and Environment (HAICTA 2015), Kavala, Greece, 17–20 September 2015.

[9] Kouriati, A.; Tafidou, A.; Lialia, E.; Prentzas, A.; Moulogianni, C.; Dimitriadou, E.; Bournaris, T. The Impact of Data Envelopment Analysis on Effective Management of Inputs: The Case of Farms Located in the Regional Unit of Pieria. Agronomy 2023, 13, 2109. https://doi.org/10.3390/agronomy13082109

[10] G. Vlontzos, M.P. Pardalos. Assess and prognosticate greenhouse gas emissions from agricultural production of EU countries, by implementing, DEA Window analysis and artificial neural networks. Renewable and Sustainable Energy Reviews 2017, 17 (C), pp. 155-162. doi: 10.1016/j.rser.2017.03.054.

[11] R. Laptes. Particularities of farm accounting. Bulletin of the Transilvania University of Brasov, Series V: Economic Sciences 2012, 5(2), pp.139-144.

[12] G. Grzelak. Evaluation of the reproduction processes in farms in Poland in context of the environmental and economic sustainability. International Journal of Economic Policy in Emerging Economies 2016, 9(2), pp.169-181.
[13] S. Kontogiannis, M.G.Tsipouras, G. Kokkonis, D. Godas, S. Valsamidis. Design and implementation of an identification productivity recording and breeding system for the sheep industry. International Journal of Sustainable Agricultural Management and Informatics 2016. 2(2/3/4), pp. 110-134.
[14] J.K. Sharma, P. K. Dubey. A need of farm records and accounting in agriculture sector. International Journal of Innovative Studies in Sociology and Humanities (IJISSH) 2019, 4(5).
[15] Kouriati, A.; Moulogianni, C.; Kountios, G.; Bournaris, T.; Dimitriadou, E.; Papadavid, G. Evaluation of Critical Success Factors for Enterprise Resource Planning Implementation Using Quantitative Methods in Agricultural Processing Companies. Sustainability 2022, 14, 6606. https://doi.org/10.3390/su14116606.
[16] A. Al-Sharafat. Analysing farm accounting skills related to financial performance of dairy industry: an evidence from Jordan. Journal of Agricultural Science 2016, 8(12), pp. 174-180. doi: 10.5539/jas.v8n12p174.
[17] C.J. Kitsopanidis, Agricultural Accounting and Financial Analysis Principles and Applications Agricultural Assessment; 3rd ed.; Ziti: Thessaloniki, 2007.