UDC 631.11

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Conceptualization of model of financial management in Romanian agriculture

Abstract. Agriculture is one of the important sectors in Romania in terms of expanding the cultivated agricultural areas, the number of people working in this field and contribution of the branch to the national economy. Considering the socio-economic dimension of the branch, agriculture represents a viable opportunity in Romania given the qualitative land fund and the pedoclimate's characteristic still favorable for obtaining financial performance in agriculture. Financial management is a challenge for economic operators in the agriculture. Due to the seasonal character of it, the managerial act of managing cash flow tables is difficult, and managers reach a high rate of indebtedness of the company. The seasonal stage of storage and trading of stocks represents for managers another challenge of financial management and brings with it randomized elements regarding the efficiency of the managerial act in the agricultural sector.
The aim of the paper is to conceptualize a modern financial management model timed in agriculture to reduce financial pressure and allow managers to gain more efficiency in managing cash flow charts. The research uses empirical and analytical study methods including literature review, analysis of economic efficiency indicators obtained by agricultural companies in Romania, study of financial projections to identify significant vulnerabilities in cash flows and conceptualization of modern financial agriculture's management model.
The results of the study will be useful to managers of agricultural entities in their approach to efficiency and performance within the development of financial strategies.

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Концептуалізація моделі фінансового менеджменту в румунському сільському господарстві

Анотація. Сільське господарство є однією з важливих галузей Румунії як із точки зору розширення оброблюваних сільськогосподарських площ і збільшення кількості людей, зайнятих у цій галузі, так і з точки зору внеску галузі в розвиток національної економіки. Враховуючи соціально-економічне значення галузі, сільське господарство є перспективним напрямом розвитку для Румунії з огляду на якісний земельний фонд і характер клімату, що сприяє досягненню фінансових результатів у даній галузі.
Метою статті є концептуалізація сучасної моделі фінансового менеджменту в сільському господарстві, орієнтованої на зменшення фінансового тиску та підвищення ефективності управління графіками руху грошових коштів. У дослідженні використовуються емпіричні й аналітичні методи, включаючи огляд літератури, аналіз показників економічної ефективності, отриманих аграрними компаніями Румунії, вивчення фінансових прогнозів для виявлення суттєвих вразливих позик у грошових потоках та концептуалізація сучасної моделі фінансового менеджменту у сільському господарстві. Результати дослідження будуть корисними керівникам сільськогосподарських підприємств у їхньому підході до забезпечення ефективності та результативності в рамках розробки фінансових стратегій.
Ключові слова: сільське господарство; фінансовий прогноз; економічна модель; фінансовий звіт; фінансовий менеджмент.

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Концептуализация модели финансового менеджмента в румынском сельском хозяйстве

Аннотация. Сельское хозяйство является одной из важных отраслей Румынии как с точки зрения расширения обрабатываемых сельскохозяйственных площадей и увеличения количества людей, занятых в этой отрасли, так и с точки зрения ее вклада в развитие национальной экономики. Учитывая социально-экономическое значение отрасли, сельское хозяйство является перспективным направлением развития для Румынии, учитывая качественный земельный фонд и характер климата, что способствует достижению финансовых результатов в данной отрасли.

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Целью статьи является концептуализация современной модели финансового менеджмента в сельском хозяйстве, ориентированной на уменьшение финансового давления и повышения эффективности управления графиками движения денежных средств. В исследовании используются эмпирические и аналитические методы исследования, включая обзор литературы, анализ показателей экономической эффективности, полученных аграрными компаниями Румынии, изучение финансовых прогнозов для выявления существенных уязвимых займов в денежных потоках и концептуализация современной модели финансового менеджмента в сельском хозяйстве. Результаты исследования будут полезными руководителям сельскохозяйственных предприятий в их подходе к обеспечению эффективности и результативности в рамках разработки финансовых стратегий.

Ключевые слова: сельское хозяйство; финансовые прогнозы; экономическая модель; отчет о движении денежных средств; финансовый менеджмент.

1. Introduction

Agriculture is a pillar of the Romanian economy due to the meeting of infrastructure conditions (soil quality, availability of local seed material, the existence of specialists in the field) and the notoriety of agricultural holdings known in international trade due to production quality (Stefan et al., 2013).

The new objectives of the CAP (European Commission, 2018) outline a new model of agricultural performance to which the member countries of the European Union are invited to join starting with 2020:

- increasing agricultural productivity by incorporating in the economic activity the components of technical progress, productive efficiency of human resources, rationalization of consumption, etc.;
- ensuring a fair standard of living for agricultural workers, by ensuring adequate incomes;
- aspects regarding the normalization of the supply related to the consumer demand and the stabilization of the markets;
- guaranteeing security of supply;
- ensuring competitive selling prices of agricultural products.

Following the implementation of the Common Agricultural Policy in Romania, several financing programs were carried out after 2007, which in the first stage included direct subsidies granted to agriculture through Pillar I of the CAP and the integrated development of the rural economy through Pillar II of the CAP. In this sense, the National Program for Rural Development (PNDR) was implemented, which took place during two financing cycles, respectively 2007-2013 and 2014-2020.

In the history, the evolution of the financing on the PNDR Program 2014-2020, for the last calendar year is present in Table 1.

Thus, agricultural financial management is a challenge through the modern valences of efficiency and effectiveness, managers having to decide on the use of market opportunities, ensuring business continuity and financial security affected by the seasonal nature of the branch.

In this table, cash flows become a priority, their management differentiating between the success of a timed modern financial management and the failure of a classic management based on the pyramid of activities and their financing through subsidies.

Table 1:
Absorption stage for the PNDR 2014-2020 program (lei)

Data		12.Apr.19	01.Jul.19	31.Dec.19	29.Feb.20	30.Apr.20
Allocation 2014-2020 (EU) NP Rural Development *		8.127.996.402	8.127.996.402	8.127.996.402	8.127.996.402	8.127.996.402
Payments to beneficiaries (EU)	Value	3.742.555.767	4.004.402.790	4.665.152.642	4.808.754.818	5.032.689.662
	%	46.05%	49.27%	56.61%	59.16%	61.92%
Pre-financing received from the EC ****	Value	325.119.856	325.119.856	325.119.856	325.119.856	325.119.856
	%	4.00%	4.00%	4.00%	4.00%	4.00%
Amounts requested by the EC within the limit of the EU allocation of the OP (current absorption rate)	Value	3.581.802.025	3.719.197.796	4.226.644.095	4.574.963.419	4.785.980.239
	%	44.07%	45.76%	52.00%	56.29%	58.88%
EC reimbursements (effective absorption rate)	Value	3.563.084.550	3.699.297.045	4.206.411.278	4.554.730.601	4.554.730.601
	%	43.84%	45.51%	51.75%	56.04%	56.04%
Total amount received from the EC	Value	3.888.204.406	4.024.416.901	4.531.531.134	4.879.850.457	4.879.850.457
	%	47.84%	49.51%	55.75%	60.04%	60.04%

Source: Processed by the authors on the basis of Ministry of European Funds
(http://mfe.gov.ro/stadiul-absorbtiei-fondurilor-ue)

2. Brief Literature Review

Financial management is a frontier area at the intersection of management and accounting and involves prospective and predictive skills eligible to assess financial stress, creditworthiness and return on investment.

Thus, some authors (Barth, Cram and Nelson, 2001) analyse the impact of prediction on actuarial accounting in relation to the cash flow of entities. The ideas are taken up in an updated version by Arthur și Chuang (Arthur and Chuang, 2006) in the scientific approach of presenting IAS 7 as an alternative method for discounting cash flows. This aspect is scientifically treat based on a statistical model that operates with cyclic data to highlight the individual effects of the variables (Figure 1).

$$CFO_{t+1} = \beta_0 + \beta_1 C\_REC_t + \beta_2 C\_PAY_t + \beta_3 C\_DIV_t + \beta_4 C\_INT\_R_t + \beta_5 C\_INT\_P_t + \beta_6 C\_TAX_t + \beta_7 C\_IN\_OTHER_t +$$
$$\beta_8 C\_OUT\_OTHER_t + \beta_9 \Delta AR_t + \beta_{10} \Delta AP + \beta_{11} \Delta INV_t + \beta_{12} DEPR_t + \beta_{13} AMORT_t + \beta_{14} OTHER_t +$$
$$\beta_{15}(T\_REC)_t(C\_REC)_t + \beta_{16}(T\_REC)_t(C\_PAY)_t + \beta_{17}(T\_REC)_t(\Delta AR)_t + \beta_{18}(T\_REC)_t(\Delta AP)_t +$$
$$\beta_{19}(T\_INV)_t(C\_REC) + \beta_{20}(T\_INV)_t(C\_PAY)_t + \beta_{21}(T\_INV)_t(\Delta AR)_t + \beta_{22}(T\_INV)_t(\Delta AP)_t +$$
$$\beta_{23}(T\_PAY)_t(C\_REC)_t + \beta_{24}(T\_PAY)_t(C\_PAY)_t + \beta_{25}(T\_PAY)_t(\Delta AR)_t + \beta_{26}(T\_PAY)_t(\Delta AP)_t + \varepsilon_t$$

Where:

T_REC = Accounts receivable turnover for firm i in year t, calculated as average accounts receivable / operating revenue.

I_INV = Inventory turnover for firm i in year t, calculated as average current inventory / operating revenue.

T_PAY = Account payable turnover for firm i in year t, calculated as average accounts payable / operating revenue.

Figure 1:
Predictability model of future cash flows
Source: Arthur and Chuang (2006)

The presented model represents a reference point for the identification of the processes related to the operational cash flows and for the mathematical quantification of the correlations with predictive impact for the increase of the agricultural financial management skills.

Another aspect regarding the financial abilities of managers to obtain efficiency and effectiveness results is the predictive ability to evaluate income as a component of cash flow (Aktaş and Karğın, 2012). The authors develop, based on a regression model, a method that tests the predictive power of cash flows on different branches of activity, including the food and beverage sector.

The Regulations governing the Statement of Cash Flow is IAS 7, which requires entities cash flow statement in the financial reporting structured operating activities, investing activities and financing activities (Deloitte, 2020). Mechelli (2009) presents structural aspects of IAS 7 on accounting harmonization and compliance in the application of accounting standards, conducting a comprehensive study of the literature and arguing the risks of possible misunderstanding of regulations and their misapplication (Mechelli, 2009).

From the point of view of agricultural financial management, Wolfert et al. (2017) resent the development of Smart agricultural entities based on computerization and implementation of information technology in management cycles. Significant factors in the financial management of Smart agricultural entities are in the opinion of the author's factors of efficiency of resource use, improved managerial control and decision-making and work with volatility in conditions of significant climate change. In addition to significant factors, there are public factors related to sustainability, food security and nutritional security. In the opinion of the authors, the communication model of Smart agricultural entities is presented in Figure 2.

From another perspective (Ďurišová et al., 2019) the information process of financial management on performance evaluation and determination of the specific weight of the price is presented in a standardized staged manner of the process as follows in Figure 3.

Florea et al. (2019) proposes a comparative analysis model based on the fuzzy method that demonstrates the causal relationship between costs, selling price and sustainable development.
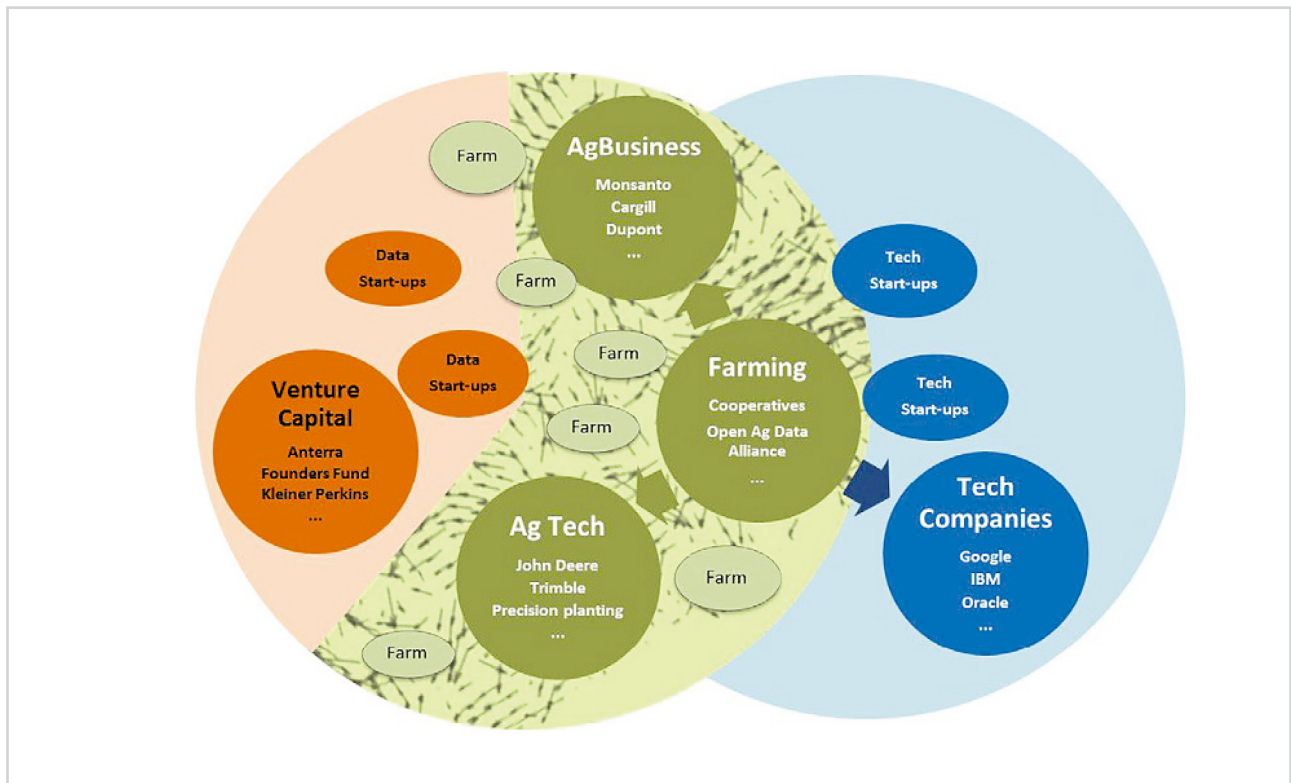
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Figure 2:
The Big Data Network of Smart agriculture entities
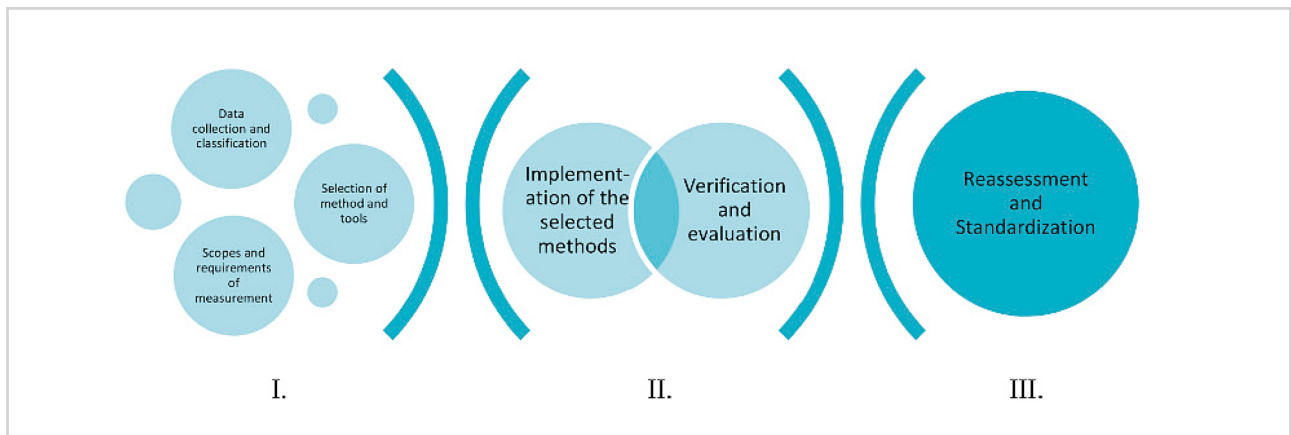Source: Wolfert et al. (2017)

Figure 3:
Phases of performance measurement process
Source: Ďurišová et al. (2019)

Therefore, the literature review shows that the issue of optimizing financial management is complex, and interacts with multiple areas and can be streamlined only after a rigorous predictive study of cash flows, which substantiates the opportunity to conduct this study.

3. The Aim and Hypotheses

The aim of the paper is to conceptualize a modern financial management model timed in agriculture to reduce financial pressure and allow managers to gain more efficiency in managing cash flow charts.

The hypothetical assumptions for our study with regard to stated above and based on conducted theoretical investigation are the following:

H1: Agriculture is one of the most important and promising sector of Romanian national economy.

H2: Effective agricultural management in Romania can reduce financial pressure and improve the efficiency of managing cash flow charts.

H3: The modern financial agriculture's management model could be described with the ARIMA method.

4. Data and Methodology

The authors analysed the statistical bases provided by the National Institute of Statistics and Eurostat and found that in the period 2008-2020 cereal agricultural production in Romania by main product categories increased from 16.778 thousand tons in 2008 to 30.924 thousand tons in year 2020, the average increase over the last 5 years being 17.7% (Table 2).

Table 2:
Romania: gross production by selected crops (thousand tonnes)

Crop		Soft wheat	Durum wheat	Grain maize	Barley	Total cereals
2008		7.176	5	7.849	1.209	16.778
2009		5.187	16	7.973	1.182	14.801
2010		5.784	28	9.042	1.311	16.651
2011		7.117	15	11.718	1.330	20.777
2012		5.276	22	5.953	986	12.773
2013		7.284	13	11.305	1.542	20.842
2014		7.565	19	11.989	1.713	22.026
2015		7.955	8	9.021	1.626	19.283
2016		8.406	25	10.746	1.817	21.721
2017		10.014	21	14.326	1.907	27.096
2018e		10.123	21	18.664	1.871	31.510
2019f		9.995	24	17.292	1.961	29.986
2020p		11.024	29	16.911	2.140	30.924
5-Year TrimAvg		9.472	22	14.121	1.865	26.267
2020f vs	5Y TrimAvg	16.40%	33.90%	19.80%	14.80%	17.70%

Source: Processed by the authors on the basis of Eurostat reports of European Commission (https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/markets/overviews/market-observatories/crops/cereals-statistics_en)

The research uses empirical and analytical study methods including analysis of economic efficiency indicators obtained by agricultural companies in Romania, study of financial projections to identify significant vulnerabilities in cash flows and conceptualization of modern financial agriculture's management model. To achieve the aim of the paper the authors used the ARIMA method by Gretl 2019 statistical program.

Wen et al. (2019) prove that the ARIMA method is applicable for the analysis of indicators characterizing the agricultural management.

ARIMA is the Autoregressive Integrated Moving Average. ARIMA is focused on correlations in the time series (Zhang, 2008). This method is based on the use of computer algorithms and machine learning techniques that allow processing and analyzing large amounts of data. ARIMA is applied to predict the dynamics of the indicator based on a series of retrospective data.

The main advantages of the ARIMA method are simplicity of use, clarity for non-expert users, reliability of obtained results, applicability and efficiency in solving various problems (Brownlee et al., 2018; Hewamalage et al., 2021).

At the same time, the ARIMA method is quite laborious, on the strength of the need for in-depth processing of large volumes of statistical data. To solve the problem of laborious, Hyndman and Khandakar (2008) propose a framework to automate ARIMA forecast.

5. Results

From the point of view of financial performance, the data provided by Eurostat (European Commission, 2021) show for Romania an average increase in the period 2009-2020 of 1.5% of revenues and a decrease of 3% of operational costs, which allowed to obtain a yield of gross margin increasing on average by 10%. Thus, revenues in euro / tonne for cereal production increased from 126 euro to 131 euro in the period 2009-2020, while expenditure decreased from 90 euro / ton to 65 euro / ton in the same period.

Unfortunately, the addition of external costs and depreciation reduced the net margin to 50 euro / ton in 2020, and the fixed costs determined a negative net productive yield in most years of the analysed period except for the year 2020 when it reached 16 euro / ton according to Figure 4.
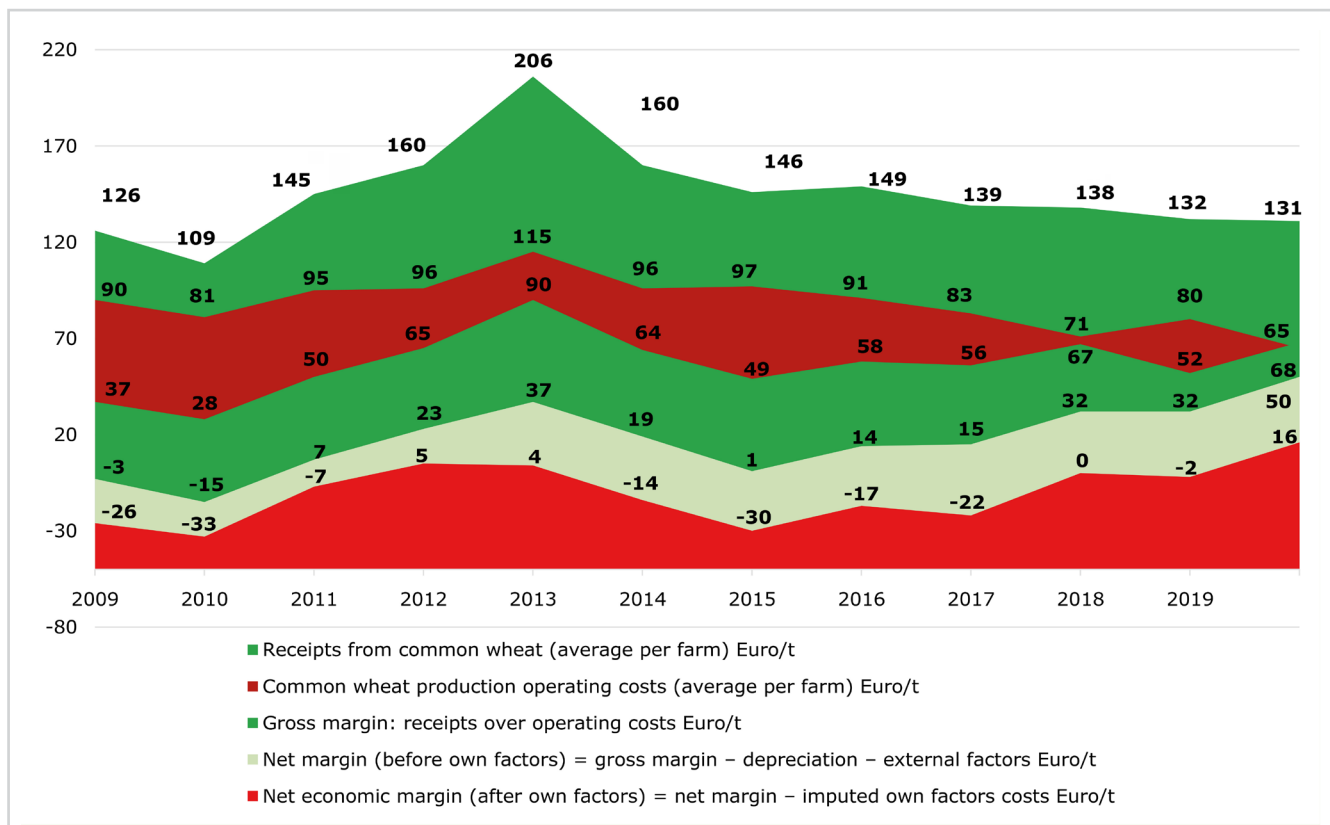
Figure 4:
Performance of agricultural financial management in Romania in the period 2009-2020
Source: Processed by the authors on the basis of Eurostat reports of European Commission
(https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/markets/overviews/-market-observatories/crops/cereals-statistics_en)

For the objective evaluation of the financial management performance, the following variables are defined:
Receipt:
average agricultural income from wheat production at the level of agricultural entity, represented by the total amount of operating income;
OpCosts:
average agricultural costs of wheat production at the level of the agricultural entity, represented by the total amount of operational costs;
GrsMrg:
gross margin of wheat production at the level of agricultural entity, represented by the difference between the average gross income and the average gross operating costs;
NtMrg:
net margin of wheat production at the level of agricultural entity, represented by the difference between the gross margin, the value of depreciations and external expenditures;
NtMrgFC:
net margin after deducting fixed costs.

The authors through an econometric model using the ARIMA method by Gretl 2019 statistical program, for the data series defined above calculated based on the mobile evolutionary averages tested the forecast dimension of the agricultural financial management performance.

The modelling results are present as follows in Figure 5 and Figure 6.

It is observed that the presented model regarding the financial management evaluated through operational cash flows is valid and has a high statistical significance of the p values of the regressor's: Recipt; OpCosts; GrsMrg.

In relation to the dependent variable, the regressor's p values being less than 0.001, while the autocorrelation statistical tests, the residual normality and the Arch test indicate statistical significance at the thresholds of 1%, 5% and 10%. The frequency distribution on the Gaussian curve

Function evaluations: 399
Gradient evaluations: 103
Model 1: ARMAX, using observations 2009-2019 (T = 11)
Estimated using the Kalman filter (exactly ML)
Dependent variable: **NtMrg**
Standard errors based on Hessian

	Coeficient	*Std. Error*	*z*	*p-value*	
const	9.60792	9.11268	1.054	0.2917	
phi_1	0.0198072	0.345995	0.05725	0.9543	
theta_1	-1.00000	0.252759	-3.956	< 0.0001	***
No. of Firms	-2.82976	3.66652	-0.7718	0.4402	
Recipt	66.7306	11.0136	6.059	< 0.0001	***
OpCosts	-45.7345	10.5790	-4.323	< 0.0001	***
GrsMrg	-24.3360	7.48505	-3.251	0.0011	***

***- *high significance*

Mean dependent var	2.705559	S.D. dependent variable	4.043365
Mean of innovations	-0.121191	S.D. of innovations	2.652032
Log-likelihood	-27.56124	Akaike criterion	71.12247
Schwarz criterion	74.30564	Hannan-Quinn	69.11594

		Real	*Imaginary*	*Module*	*Frequency*
AR					
	Root 1	50.4868	0.0000	50.4868	0.0000
MA					
	Root 1	1.0000	0.0000	1.0000	0.0000

Residual normality test –
The null hypothesis: the error is normally distributed
Statistical test: Hi square (2) = 4.73548
with *p*-value = 0.0936925
Residue autocorrelation function
***, **, * indicates significance at thresholds 1%, 5%, 10%
using standard Bartlett errors for ACF

LAG	FAC	FACP
1	-0.0584	-0.0584
2	-0.2954	-0.2998

Test for 2nd order ARCH –
Null hypothesis: no ARCH effect is present
Test statistic: LM = 2.991
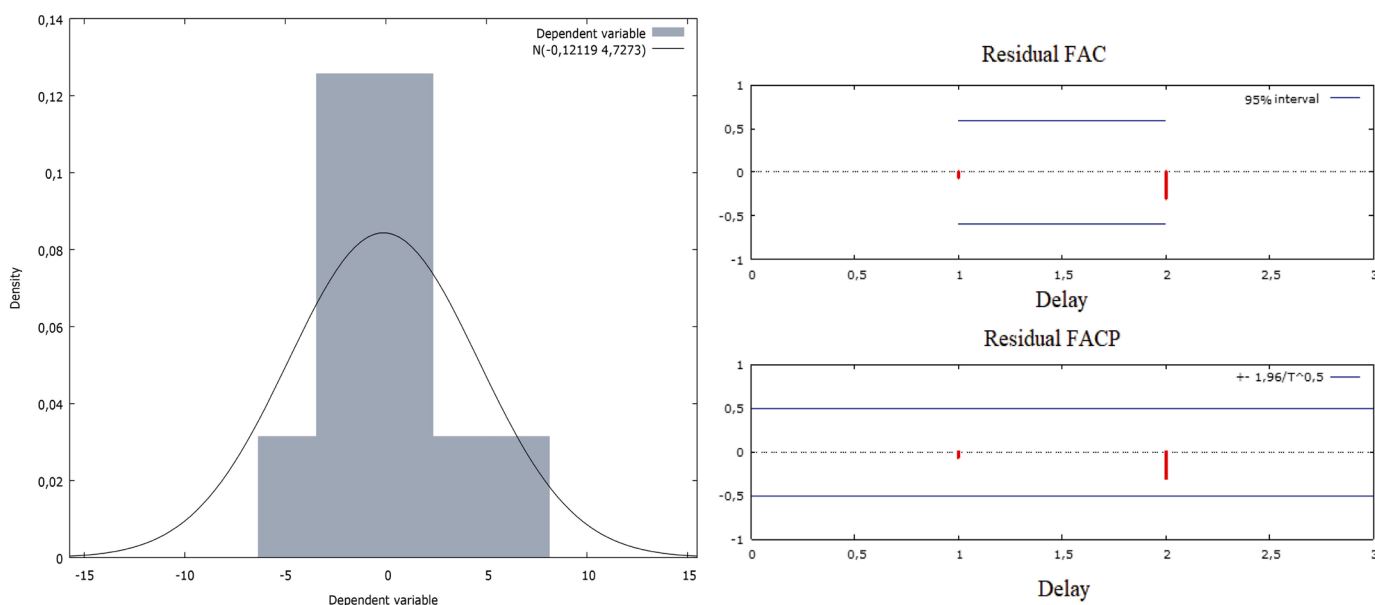with *p*-value = P(Hi square (2) > 2.991) = 0.224136

Figure 5:
Distribution of the dependent variable by frequency series
Source: Compiled by the authors

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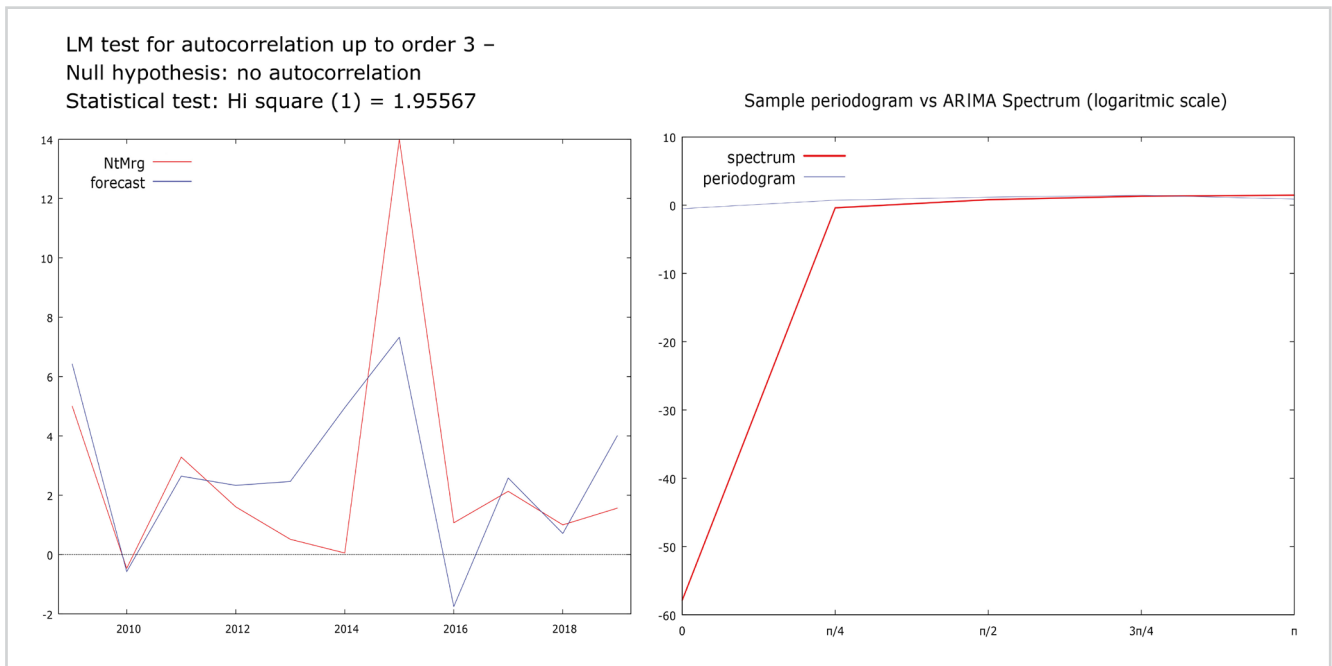
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Figure 6:
Predictive diagram of the dependent variable on 95% confidence interval
Source: Compiled by the authors

indicates the inflection at the maximum point of the curve being normally distributed the error in the null hypothesis, the statistical test reflecting p - value < 0.1.

Financial management is a challenge for agricultural entities in Romania whose number decreased in the period analysed from 54.811 farms in 2009 to 28.257 farms in 2020. According to Figure 7, the forecast graph indicating for the trend equation for a forecast period of 3 years until 2022, a maintenance of the number of agricultural entities around 30,000 companies, according to the formula: $y = -18.569x2 + 74441x - 7E + 07$.

The value of the average incomes of Romanian companies in euro / ton is estimated to decrease in the next 3 years under the influence of disruptive factors induced by the economic crisis and
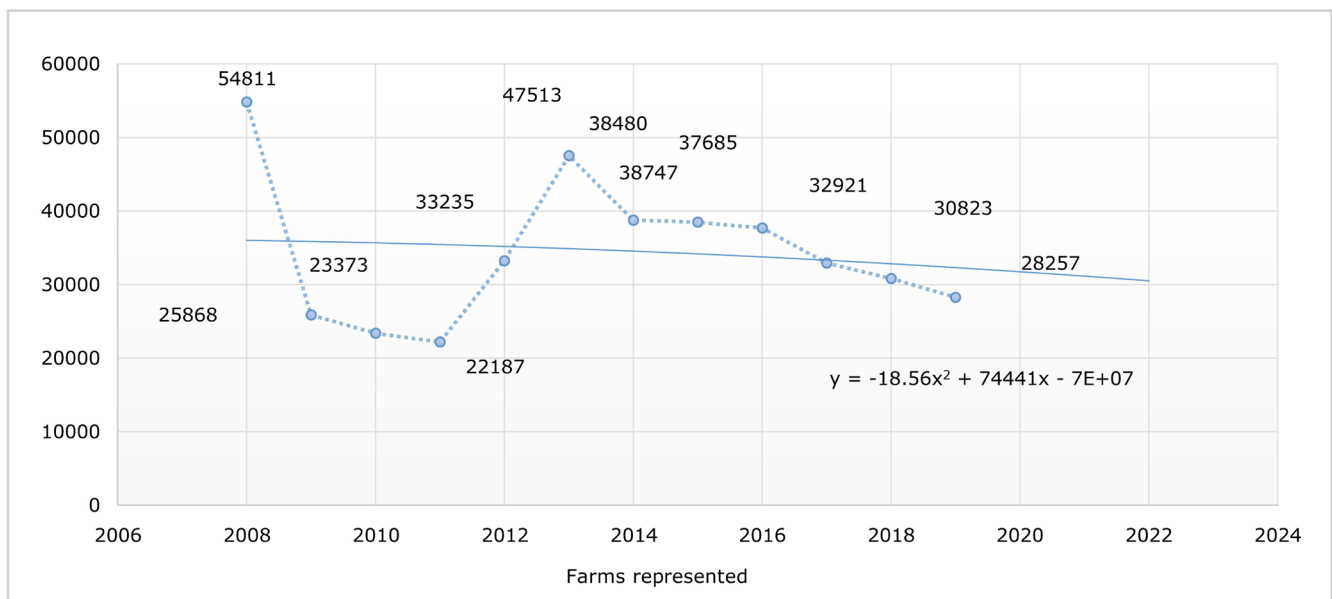

Figure 7:
Predictive dynamics of the number of agricultural entities
Source: Processed by the authors on the basis of Eurostat reports of European Commission
(https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/markets/
overviews/market-observatories/crops/cereals-statistics_en)

climate change on a trend curve defined by the trend equation: $y = -1.4098x2 + 5677.2x - 6E + 06$, according to Figure 8.

As a result of this decrease, the gross margin obtained from agricultural activity will also be affected (Figure 9).

The research highlighted the need to reanalyse financial management in the medium term in order to reposition financial strategies for the recovery of agricultural entities and reposition the activity based on efficiency and effectiveness.

6. Discussion

In today's turbulent conditions of exogenous environment with a high degree of uncertainty, the financial management system in agriculture should be formed on the basis on the principles of flexibility and adaptability. This means the ability of this system to respond quickly and adequately to internal and external challengers (Bampasidou et al., 2017; Lemiskko, 2018). Not only climatic factors need to be taken into account (Makkonen et al., 2021; Grünig et al., 2011), but also a set of aspects related to investment processes should be considered (Zakharin et al., 2021; Zhuravlyov et al., 2019). In addition, we fully share the views of scholars who insist on the need to adjust approaches and to update tools of financial management in agriculture in response to the impact of the crisis in economy (Zavalko, 2018).
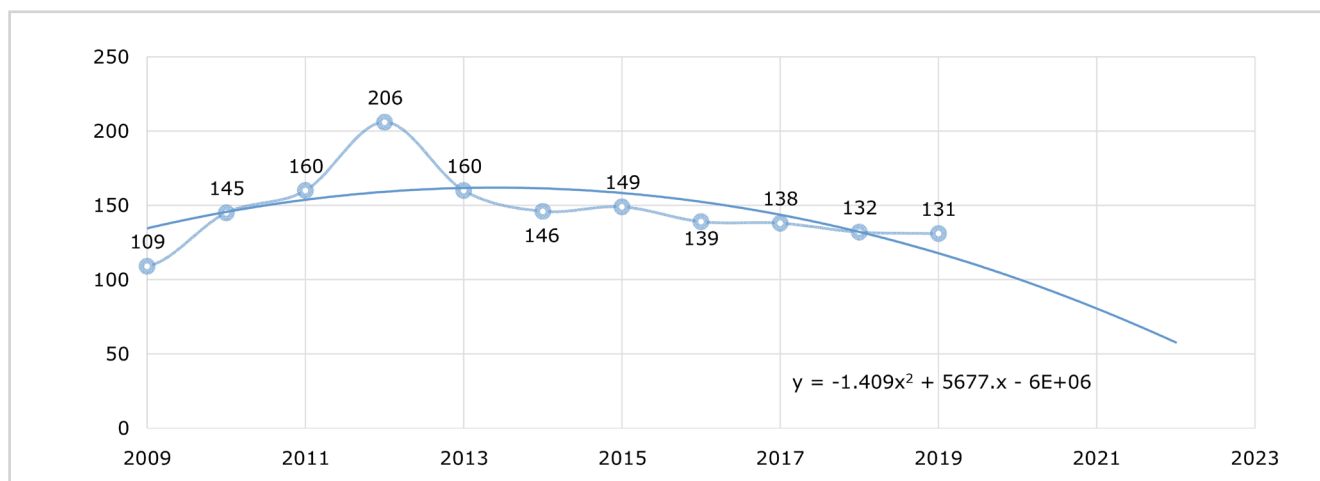

Figure 8:
Receipts from agriculture production (average per farm) Euro / t
Source: Processed by the authors on the basis of Eurostat reports of European Commission
(https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/markets/
overviews/market-observatories/crops/cereals-statistics_en)

Figure 9:
Gross margin: receipts over operating costs Euro / t
Source: Processed by the authors on the basis of Eurostat reports of European Commission
(https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/markets/
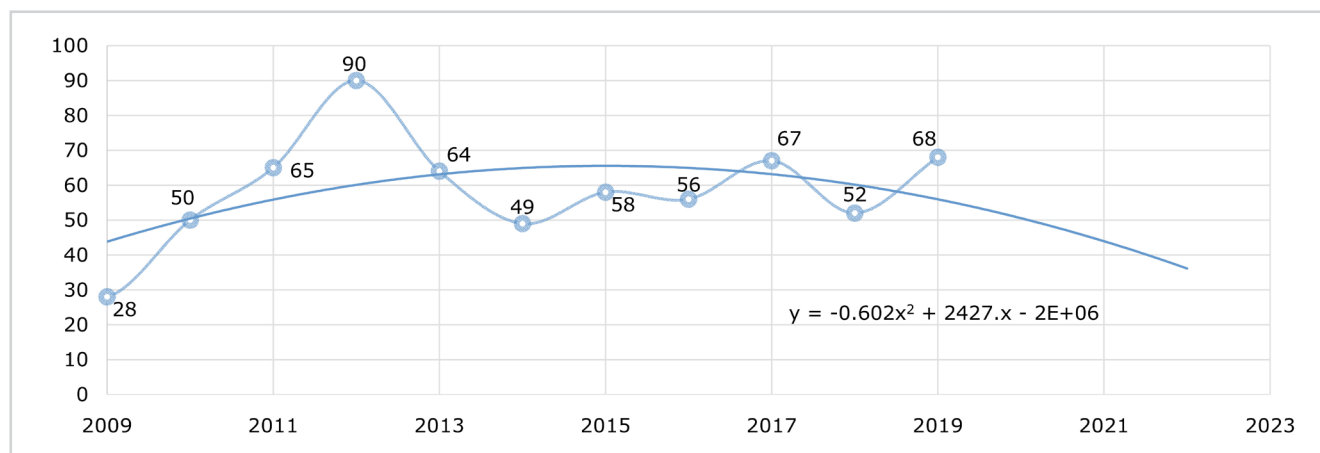overviews/market-observatories/crops/cereals-statistics_en)

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We consider recommendations formulated by Barmuta and Tuguz (2021), Garcia-Benau et al. (2021) to ensure financial risk management at agro-industrial enterprises to be appropriate. Given high dynamics of the external environment, risk management is an integral part of effective financial management of agriculture (Popescu, 2015). Qualitatively organized risk management will avoid or mitigate adverse effects of external factors and processes on the activities of agricultural enterprises, and in particular on their financial stability. In this context, it is appropriate to single out the study of Achim et al. (2021), within which the impact of the corona crisis in financial management in Romania is analyzed. Some results of this study showed that the country's small agricultural companies during the pandemic showed better financial performance than a number of large and medium-size enterprises in various sectors the Romanian economy.

Another trend that emerged by 2020 but was greatly exacerbated by the corona crisis was digitalization (Shkarlet et al., 2019). Digital technologies and modern tools for handling large amounts of information must be integrated into the financial management system of agriculture (Mishurov et al., 2021; Viknianska et al., 2021; Zybareva et al., 2019). Moreover, information innovative technologies are now becoming a powerful tool for accessing effective financial and economic activities (Bieliaieva, 2017) and controlling (Khudyakova et al., 2019; Akhmetshin et al., 2018) at the enterprise.

In conclusion, we should state that in contemporary financial management in agriculture, regional (Uspambayeva et al., 2020; Shkarlet et al., 2020; Tranchenko et al., 2018) and infrastructural (Andriushchenko et al., 2019) aspects must be obligatory considered. This will ensure the complexity of the management system and open opportunities for involving support for agricultural enterprises from stakeholders of different sector of national economy. Gaining broad support at the corporate (macro-economic) level in the implementation of financial management measures involves its coordination with key principles and objectives of strategic management at agro-industrial enterprises (Buiga et al., 2010; Liliana, 2015; Oliinyk, 2017; Samygin et al., 2019).

We see prospects for further research in the development of a concept of the effective financial management system in agriculture, which would be consistent with the strategic vision of the industry in Romania, and take into account potential risks, digitalization factors, regional and institutional factors.

7. Conclusion

The authors analyzed the managerial act of managing financial flows in agricultural entities in Romania from the perspective of economic achievements in the last 11 years, based on official reports. The research results identified the economic vulnerabilities that will affect agricultural entities in the next 3 years regarding cash flows, being develop an efficiency econometric model based on the ARIMA method, which raises for agricultural economic operators vulnerability signals in the sense of negative adjustment of forecast trend curves. The study is useful for the top management of agricultural entities as it identifies the subsequent negative evolution of the financial performance of agricultural entities based on the oscillating results of previous performances and warns of the need to reposition financial strategies.

References

1. Achim, M. V., Safta, I. L., Văidean, V. L., Mureșan, G. M., & Borlea, N. S. (2021). The impact of covid-19 on financial management: evidence from Romania. Economic Research-Ekonomska Istraživanja, 1-26. https://doi.org/10.1080/1331677x.2021.1922090
2. Akhmetshin, E. M., Vasilev, V. L., Mironov, D. S., Zatsarinnaya, E. I., Romanova, M. V., & Yumashev, A. V. (2018). Internal control system in enterprise management: analysis and interaction matrices. European Research Studies Journal, 21(2), 728-740. https://www.researchgate.net/publication/327248963_Internal_control_system_in_enterprise_management_Analysis_and_interaction_matrices
3. Aktaş, R., & Karğın, S. (2012). Predictive Ability of Earnings and Cash Flows: Evidence from Turkish Firms' Cash Flow Statements Prepared by IAS 7. Journal of Money, Investment and Banking, 25, 171-180. https://www.researchgate.net/publication/290394282_Predictive_Ability_of_Earnings_and_Cash_Flows_Evidence_from_Turkish_Firms'_Cash_Flow_Statements_that_Prepared_by_IAS_7
4. Andriushchenko, K., Ishchenko, M., Sahaidak, M., Tepliuk, M., & Domina, O. (2019). Prerequisites for the creation of financial and credit infrastructure of support for agricultural enterprises in Ukraine. Banks and Bank Systems, 14(2), 63-75. https://doi.org/10.21511/bbs.14(2).2019.06
5. Arthur, N., & Chuang, G. Ch.-H. (2006). IAS 7 alternative methods of disclosing cash flow from operations: evidence on the usefulness of direct method cash flow disclosures. The University of Sydney: Sydney, Australia. Citeseer. https://www.semanticscholar.org/paper/IAS-7-Alternative-Methods-of-Disclosing-Cash-Flow-Arthur-Chuang/f7d0798c2ad2cfe148326abf42ccfebe5dd1ef6c

Grosu, V., Kholiavko, N., Zhavoronok, A., Zlati, M. L., & Cosmulese, C. G. / Economic Annals-XXI (2021), 191(7-8(1)), 54-66

64

6. Bampasidou, M., Mishra, A. K., & Moss, Ch. B. (2017). Modeling debt choice in agriculture: the effect of endogenous asset values. Agricultural Finance Review, 77(1), 95-110. https://doi.org/10.1108/AFR-06-2016-0054
7. Barmuta, K., & Tuguz, N. (2021). Organizational and Managerial Mechanism for Risk Management of Agricultural Enterprises. E3S Web of Conferences, 273, 08005. https://doi.org/10.1051/e3sconf/202127308005
8. Barth, M. E., Cram, D. P., & Nelson, K. K. (2001). Accruals and the prediction of future cash flows. The accounting review, 76(1), 27-58. https://www.jstor.org/stable/3068843
9. Bieliaieva, N. A. (2017). Financial and economic activities effectiveness evaluation as a condition of corporate management decisions making. Baltic Journal of Economic Studies, 3(4), 12-17. https://doi.org/10.30525/2256-0742/2017-3-4-12-17
10. Brownlee, J. D. (2018). Learning for Time Series Forecasting: Predict the Future with MLPs, CNNs and LSTMs in Python. Machine Learning Mastery: New York, NY, USA.
11. Buiga, A., Berevoianu, R., & Cucu, V. (2010). Designing strategies for agribusiness complexes in Romania. Annals of DAAAM and Proceedings of the International DAAAM Symposium, 1025-1026. https://www.daaam.info/Downloads/Pdfs/proceedings/proceedings_2010/24201_Annals_1_head.pdf
12. Deloitte. (2020). IAS 7 - Statement of Cash Flows, IASPLUS. https://www.iasplus.com/en/standards/ias/ias7
13. Ďurišová, M., Tokarčíková, E., Virlanuta, F. O., & Chodasová, Z. (2019). The Corporate Performance Measurement and Its Importance for the Pricing in a Transport Enterprise. Sustainability, 11(21), 6164. https://doi.org/10.3390/su11216164
14. European Commission. (2018). Regulation of the European Parliament and of the Council establishing rules on support for strategic plans to be drawn up by Member States under the Common agricultural policy (CAP Strategic Plans) and financed by the European Agricultural Guarantee Fund (EAGF) and by the European Agricultural Fund for Rural Development (EAFRD) and repealing Regulation (EU) No. 1305/2013 of the European Parliament and of the Council and Regulation (EU) No. 1307/2013 of the European Parliament and of the Council. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A392%3AFIN
15. European Commission. (2021). Cereals statistics, eurostat datbase. https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/markets/overviews/market-observatories/crops/cereals-statistics_en
16. García-Benau, M. A., Gambetta, N., & Sierra-García, L. (2021). Financial Risk Management and Sustainability. Sustainability, 13(15), 8300. https://doi.org/10.3390/su13158300
17. Grünig, R., & Kühn, R. (2011). Processbased Strategic Planning. Springer Verlag Berlin Heidelberg.
18. Hewamalage, H., Bergmeir, Ch., & Bandara, K. (2021). Recurrent Neural Networks for Time Series Forecasting: Current status and future directions. International Journal of Forecasting, 37(1), 388-427. https://doi.org/10.1016/j.ijforecast.2020.06.008
19. Hyndman, R. J., & Khandakar, Y. (2008). Automatic Time Series Forecasting: The Forecast Package for R. Journal of Statistical Software, 27(3), 1-22. https://doi.org/10.18637/jss.v027.i03
20. Khudyakova, T., Shmidt, A., & Shmidt, S. (2019). Implementation of controlling technologies as a method to increase sustainability of the enterprise activities. Entrepreneurship and Sustainability Issues, 7(2), 1185-1196. https://doi.org/10.9770/jesi.2019.7.2(27)
21. Lemishko, O. (2018). Modelling of endogenous factors impacting the efficiency of the aggregate capital in Ukraine's agriculture. Economic Annals-XXI, 170(3-4), 10-14. https://doi.org/10.21003/ea.V170-02
22. Liliana, B. R. (2015). The production program of strategic planning as a method of agricultural production. Case study: South Region of Romania. Proceedings of the 26th International Business Information Management Association Conference - Innovation Management and Sustainable Economic Competitive Advantage: From Regional Development to Global Growth, 1716-1726.
23. Makkonen, A., Vallström, D., Uddin, G. S., Rahman, M. L., & Haddad, M. F. C. (2021). The effect of temperature anomaly and macroeconomic fundamentals on agricultural commodity futures returns. Energy Economics, 100, 105377. https://doi.org/10.1016/j.eneco.2021.105377
24. Mechelli, A. (2009). Accounting harmonization and compliance in applying IASB standards: An empirical survey about the first time adoption of IAS 7 by Italian listed groups. Accounting in Europe, 6(2), 231-270. https://doi.org/10.1080/17449480903172077
25. Ministry of European Funds. (2020). Stadiul absorbţiei fondurilor UE, mfe website. http://mfe.gov.ro/stadiul-absorbtiei-fondurilor-ue (in Romanian)
26. Mishurov, N. P., Voytyuk, V. A., & Sypok, S. I. (2021). Management of export activities of agricultural enterprises using digital technology. IOP Conf. Series: Earth and Environmental Science, 723, 032056. https://doi.org/10.1088/1755-1315/723/3/032056
27. Oliinyk, V. (2017). Optimal management of the enterprise's financial flows. Journal of Advanced Research in Law and Economics, 8(6), 1875-1883. https://journals.aserspublishing.eu/jarle/article/view/1840
28. Popescu, A. (2015). An empirical research on the bankruptcy risk prediction in Romania's agriculture. Proceedings of the 26th International Business Information Management Association Conference - Innovation Management and Sustainable Economic Competitive Advantage: From Regional Development to Global Growth, 2196-2204.
29. Samygin, D. Yu., Imyarekov, S. M., Tolmacheva, N. P., & Kargin, Yu. I. (2019). Strategic management of modern financial requirements in agriculture. IOP Conference Series: Earth and Environmental Science, 341, 012214. https://doi.org/10.1088/1755-1315/341/1/012214
30. Shkarlet, S., Ivanova, N., Popelo, O., Dubyna, M., & Zhuk, O. (2020). Infrastructural and regional development: theoretical aspects and practical issues. Estudios de Economia Aplicada, 38(4), Special Issue: The Recent Economic Trends and their Impact on Marketing. https://doi.org/10.25115/eea.v38i4.4002
31. Shkarlet, S., Kholiavko, N., & Dubyna, M. (2019). Information Economy: Management of Educational, Innovation, and Research Determinants. Marketing and Management of Innovations, 3, 126-141. http://doi.org/10.21272/mmi.2019.3-10
32. Shkarlet, S., Kholiavko, N., Dubyna, M., & Zhuk, O. (2019). Innovation, Educational, Research Components Of The Evaluation Of Information Economy Development (As Exemplified By Eastern Partnership Countries). Marketing and Management of Innovations, 1, 70-83. http://doi.org/10.21272/mmi.2019.1-06

Grosu, V., Kholiavko, N., Zhavoronok, A., Zlati, M. L., & Cosmulese, C. G. / Economic Annals-XXI (2021), 191(7-8(1)), 54-66

65

33. Stefan, G., & Coca, O. (2013). The Romanian agriculture - Source of competitive advantage. Creating Global Competitive Economies: 2020 Vision Planning and Implementation - Proceedings Paper, 1-3, 303-309. http://www.uaiasi.ro/revagrois/PDF/2013-1/paper/2013-56(1)_60-en.pdf

34. Tranchenko, L., Petrenko, N., Kustrich, L., Parubok, N., & Tranchenko, O. (2018). Strategic management optimization of the regional agricultural sector by means of modern forecast modeling instruments. Problems and Perspectives in Management, 16(4), 64-74. http://doi.org/10.21511/ppm.16(4).2018.06

35. Uspambayeva, M., Zeinelgabdin, A., Turebekova, B., Rakayeva, A., Tulaganov, A., & Taipov, T. (2020). Agriculture in Kazakhstan: effective financial management. Brazilian Journal of Political Economy, 40(3), 554-565. https://doi.org/10.1590/0101-31572020-3127

36. Viknianska, A., Kharynovych-Yavorska, D., Sahaidak, M., Zhavoronok, A., & Filippov, V. (2021). Methodological approach to economic analysis and control of enterprises under conditions of economic systems transformation. Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, 4, 150-157. https://doi.org/10.33271/nvngu/2021-4/150

37. Wen, Q., Wang, Y. P., Zhang, H. D., & Li, Z. (2019). Application of ARIMA and SVM mixed model in agricultural management under the background of intellectual agriculture. Cluster computing, 22, 14349-14358. https://doi.org/10.1007/s10586-018-2298-5

38. Wolfert, S. Ge, L., Verdouw, C., & Bogaardt, M.-J. (2017). Big Data in Smart Farming - A review. Agricultural Systems, 153, 69-80. https://doi.org/10.1016/j.agsy.2017.01.023

39. Zakharin, S., Stoyanova-Koval, S., Kychko, I., Marhasova, V., & Shupta, I. (2021). Strategic Management of the Investment Process in the Agricultural Sector (for Example, Agricultural Enterprises and the Food Industry). Journal of Optimization in Industrial Engineering, 14(Special Issue), 185-194. https://doi.org/10.22094/JOIE.2020.677867

40. Zavalko, N. A., Kozhina, V. O., Kovaleva, O. P., Kolupaev, R. V., & Lebedeva, O. Ye. (2018). System Approach to Diagnostics and Early Prevention of a Financial Crisis at an Enterprise. Journal of Applied Economic Sciences, 13(1), 84-88. https://www.researchgate.net/publication/326174093_System_approach_to_diagnostics_and_early_prevention_of_a_financial_crisis_at_an_enterprise

41. Zhang, H., Zhu, K. L., & Han, C. L. (2008). Evaluating the Forecast of ARIMA Models Based on Statistical Methods. Recent advance in statistics application and related areas, 1(2), 450-453.

42. Zhuravlyov, V., Khudyakova, T., Varkova, N., Aliukov, S., & Shmidt, S. (2019). Improving the strategic management of investment activities of industrial enterprises as a factor for sustainable development in a crisis. Sustainability, 11(23), 6667. https://doi.org/10.3390/su11236667

43. Zybareva, O., Verbivska, L., Lopashchuk, I., Kalaman, O., Derkach, T., & Smentyna, T. (2019). Strategically-Oriented Enterprise Management through Information Systems. International Journal of Recent Technology and Engineering, 8(2), 3014-3017. https://www.ijrte.org/wp-content/uploads/papers/v8i2/B2900078219.pdf

Grosu, V., Kholiavko, N., Zhavoronok, A., Zlati, M. L., & Cosmulese, C. G. / Economic Annals-XXI (2021), 191(7-8(1)), 54-66

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