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**BANK FINANCING OF BUSINESS PROCESSES IN THE AGRICULTURAL
SECTOR IN BULGARIA**

Abstract

of a dissertation for the award of the educational and scientific degree “Doctor”

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The dissertation consists of 236 pages, including: Introduction (4 pages); Main body structured into three chapters (195 pages); Conclusion (2 pages); References (14 pages); two appendices (14 pages). The main text contains 42 tables and 39 figures. The list of references comprises 199 sources, including printed publications and online sources.

The public defense of the dissertation will take place on at a.m./p.m. in Hall of the University of Economics – Varna, at a meeting of the Scientific Jury appointed by Order No. of the Rector of the University of Economics – Varna.

I. GENERAL CHARACTERISTICS OF THE DISSERTATION

1. Relevance and Significance of the Research Problem

The agricultural sector occupies a strategic position in the economy of Bulgaria and represents a key element of the European Union's policies through the Common Agricultural Policy. It performs essential functions related to food security, employment in rural areas, the foreign trade balance, and the sustainable use of natural resources, while simultaneously providing raw materials for the food-processing industry and contributing to the country's export potential. In this context, access to adequate financial resources for the functioning and development of agricultural enterprises becomes a key factor for the sustainability of the sector.

Under the conditions of a modern market economy, bank financing has established itself as the main source of capital, ensuring both current liquidity needs and long-term investments for modernization and technological upgrading. Nevertheless, access to bank credit in the agricultural sector remains uneven, particularly for small and medium-sized farms, which leads to structural imbalances and polarization.

The relevance of the research problem is further determined by the specific characteristics of agricultural production, such as its biological and climatic dependence, seasonality of revenues, long production cycles, and market volatility. These factors shape a higher risk profile of agricultural business, which adversely affects creditworthiness and results in the application of more conservative banking approaches, including higher collateral requirements and a higher cost of credit resources.

An additional aspect is the impact of the Common Agricultural Policy through direct payments and investment measures, which, as a factor generating income and liquidity for agricultural holdings, plays a positive role in bank financing. Dependence on subsidies, on the other hand, creates additional vulnerability to changes in the regulatory framework, shifting EU priorities, and environmental requirements imposed on production.

The new challenges arising from the dynamics of the global economic and geopolitical environment, disruptions in supply chains, and fluctuations in energy and raw material prices increase uncertainty and enhance the importance of effective

financial management. Under these conditions, access to bank financing acquires not only the function of a source of capital, but also the role of a mechanism for management and monitoring by financial institutions. There is a need for a deeper understanding of the relationship between business processes within agricultural enterprises and the manner in which they are financed. All processes production, investment, as well as management processes in agriculture require a specific financial approach aligned with the time structure of cash flows and the life cycle of production. The lack of an integrated approach may lead to inefficient use of financial resources, restricted access to credit, and limited opportunities for sustainable growth.

The practical significance of the study is reflected in its potential to support all stakeholders in managerial decision-making. For agricultural producers, the results provide opportunities for improved planning, optimization of the capital structure, and enhancement of creditworthiness. For financial intermediaries, the developed models may serve as a basis for improving credit products and enhancing the assessment of solvency through the development of flexible and sustainable approaches to agricultural business.

In summary, the relevance and significance of the research problem are determined by the strategic role of the agricultural sector, which operates in an increasingly complex economic environment under the influence of unpredictable risks. The identification of the business profile is necessary for more effective bank financing, tailored to the specific characteristics of business processes. The analysis of all interrelationships creates the prerequisites for formulating scientifically grounded and practically applicable solutions aimed at the sustainable development and competitiveness of the agricultural sector in Bulgaria.

2. Subject and Object of the Research

The object of the research in the dissertation is the financing of business processes in agricultural enterprises, viewed as a system of financial relations, institutions, and instruments for capital provision.

The subject of the research is bank financing of the agricultural sector, including its forms, levels, conditions, and determining factors.

3. Aim and Objectives of the Research

The aim of the dissertation is, through clarifying the theoretical and methodological foundations of bank financing of business processes in the agricultural sector, to analyze the factors influencing the demand for financial capital and, on this basis, to identify key models and substantiate opportunities for improving the financing of agribusiness in Bulgaria.

In order to achieve this aim, the following main objectives are formulated and consistently implemented in each chapter of the dissertation:

1. To clarify the theoretical and methodological foundations of bank financing by identifying the key characteristics, participants, and risks in the agricultural sector, as well as the factors influencing business processes.

2. To examine business processes and the relationships between them as elements of an integrated production system, as well as the impact of economic factors on these processes.

3. To analyse existing models and approaches for assessing financial potential and creditworthiness, highlighting their advantages and limitations.

4. To propose author-developed models and practical guidelines for improving bank financing of business processes in the agricultural sector, aimed at sustainable growth, enhanced competitiveness, and effective interaction with financial institutions.

4. Main Thesis and Hypotheses

The main research thesis is that the financial security of the agricultural sector in Bulgaria can be achieved through the application of an approach to bank financing that takes into account the specific parameters and interdependencies of business processes in the sector. Such an approach enables the optimal use of the opportunities of the national financial system to provide working and investment capital, thereby enhancing sustainability and competitiveness, strengthening the financial stability of the sector, and creating prerequisites for predictable long-term economic growth.

Four hypotheses are formulated and tested in the course of the research:

Hypothesis 1. Larger agricultural holdings with higher annual turnover use bank financing more frequently than small and micro holdings, with such financing primarily directed toward investments in fixed assets, while current operations and working capital needs are financed mainly through own funds and trade credit.

Hypothesis 2. Agricultural producers with longer managerial experience demonstrate a higher propensity to use investment and long-term bank loans, while the perceived high cost of bank financing has a negative impact on the intensity of its use.

Hypothesis 3. Specialized banking products for agribusiness are perceived as more suitable than standard loans due to flexible repayment schedules and tailored collateral requirements.

Hypothesis 4. Direct payments under the Common Agricultural Policy have a positive impact on access to bank financing. For holdings that introduce new technologies and develop sustainable practices, this effect also leads to higher investment activity.

5. Limitations in the Development of the Dissertation

In the development of the dissertation, a number of limitations were applied, arising both from the selected object and subject of the research, as well as from the methodology used and the available information base. For this purpose, the study is territorially limited and covers exclusively the agricultural sector in Bulgaria. The conclusions and recommendations formulated are valid within the national economic and institutional environment and cannot be automatically applied to other countries. The dissertation focuses on bank financing as the main source of external capital for agricultural enterprises. Other alternative forms of financing are also considered, but they are not subject to in-depth analysis, insofar as their role in the Bulgarian agricultural sector is limited and secondary.

The empirical research is subject to the limitations of the selected sample. The analysis deliberately excludes both very large agricultural enterprises and the smallest micro-holdings. This limits the representativeness for these groups and directs the results primarily toward small and medium-sized agricultural enterprises. In addition, the primary data used are based on a survey and expert interviews, which implies the

presence of subjectivity related to the perceptions, experience, and interpretations of the respondents. Despite the methods applied to minimize undesirable effects, the influence of individual assessments cannot be completely ruled out.

6. Information Support

The information support of the dissertation is based on a methodological framework built from a combination of approaches, methods, and primary and secondary sources of information. This enables the systematic collection, processing, and interpretation of data sources related to bank financing of business processes in the agricultural sector of Bulgaria. From a methodological perspective, the systemic and process-based approaches are applied, allowing the market to be examined both as a complex economic system and as a sequence of interrelated processes. Comparative and factor analyses are used, through synthesis and systematic aggregation of empirical data obtained from the conducted primary survey. These research tools are applied in order to achieve objectivity in the analysis and well-grounded conclusions.

For the purposes of the dissertation research, a survey was conducted among managers and owners of agribusiness companies operating in the four main subsectors: grain production, vegetable production, fruit growing, and livestock farming. The survey covers owners and managers of agricultural enterprises and was conducted anonymously in order to limit subjective bias and enhance the reliability of the collected data. The questions are structured in accordance with the aims and objectives of the research and allow for a quantitative analysis of the attitudes, behaviour, and practices of agricultural producers. The data collected through qualitative expert inquiry in the form of unstructured interviews complement the quantitative study with expert assessments from industry specialists.

The information base of the dissertation includes a wide range of sources of both scientific and practical nature. Specialized literature in the fields of agricultural economics and international trade is used, as well as official documents, strategic programs, and sectoral analyses issued by the Ministry of Agriculture and Food of the Republic of Bulgaria. International information resources also contribute to the analysis, including data from the Food and Agriculture Organization (FAO), the United Nations

(UN), the European Commission, and the World Bank. In addition, databases and statistical datasets of the National Statistical Institute (NSI) are used, along with international sources such as FAOSTAT, the United States Department of Agriculture (USDA), and Eurostat.

II. STRUCTURE AND CONTENT OF THE DISSERTATION

The dissertation is structured into an introduction, three chapters, a conclusion, and references, which present the logical sequence of its content.

CONTENT

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- 1.1. Essence, functions, scope, levels, and participants in the process of bank financing
 - 1.1.1. Three-level research model
 - 1.1.2. Participants in the process of bank financing
 - 1.1.3. Financial barriers and polarization in the agricultural sector
- 1.2. Main business processes in agricultural enterprises and determining factors in the financing process
 - 1.2.1. Production processes as a basis for financial needs
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 - 1.2.3. Determinants of bank financing in the agricultural sector
 - 1.2.4. Relationship between financing, risks, and processes
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3.3.1. Stakeholders

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III. MAIN CONTENT OF THE DISSERTATION

CHAPTER ONE: THEORETICAL AND METHODOLOGICAL ASPECTS OF BANK FINANCING OF PROCESSES IN THE AGRICULTURAL SECTOR

The first chapter of the dissertation is devoted to clarifying the theoretical and methodological aspects of the study. Its main objective is to build a conceptual framework by systematizing the key concepts, functions, participants, and models that determine the process of bank financing.

In paragraph 1.1 “Essence, functions, scope, levels, and participants in the process of bank financing”, bank financing is presented as a system of relations and financial instruments through which the necessary capital for agricultural production is provided. Emphasis is placed on the intermediary function of financial institutions in the transformation of liquidity, information, and risk between holders of free capital and agricultural enterprises. It is further noted that the biological nature of production, dependence on climatic factors, seasonality of revenues, and high capital intensity determine an increased need for external financing.

Bank financing is presented not only as a source of financial resources, but also as an important factor influencing the financial discipline of farm managers. The main functions of bank financing are systematized, among which the reduction of information asymmetry between creditors and borrowers stands out, as well as control over the

financial condition of farms through regular monitoring and active credit risk management. The role of banks in the more efficient allocation of limited financial resources in the agricultural sector is emphasized. Banks are also viewed as a systemic mechanism for selection, control, and guidance of the development of agricultural holdings.

The analysis is conducted within the framework of a three-level model, which includes three main levels: micro, meso, and macro. At the micro level, the agricultural holding is examined as an economic entity, including the structure of production, cash flows, and the ability to service liabilities. At the meso level, the interaction between banks and agricultural enterprises is presented, along with credit technologies for assessing creditworthiness, internal banking rules, and monitoring mechanisms. The macro level is examined within the scope of the institutional environment, encompassing macroeconomic conditions, the capacity of the banking sector, and the regulatory framework.

The section also outlines the scope of bank financing, whereby working capital financing is aimed at covering current and seasonal liquidity needs, while investment financing supports the acquisition of fixed assets through which production is modernized and upgraded. Special attention is paid to the participants in the process of bank financing: agricultural holdings are presented as the main borrowers, while banks are examined in their role as bearers and managers of financial risk. State and regulatory authorities are identified as factors shaping the institutional framework and defining the rules of the system. The analysis also includes other participants, such as guarantee funds, insurance companies, and consultants, which complement the financing mechanism.

In conclusion, it is emphasized that bank financing represents a fundamental element for the functioning and development of the agricultural sector. The interrelationships between the different levels of analysis and the participants in the process determine both access to capital and the opportunities for sustainable development and enhanced competitiveness of agricultural holdings.

In the second paragraph, 1.2 “Main business processes in agricultural enterprises and determining factors in the financing process,” the factors determining the

functioning of the analysed process are examined, with emphasis placed on their complex and interrelated effects. It is concluded that agricultural enterprises are characterized by specific production, organizational-functional, and financial features that shape the cost and revenue structure, the dynamics of cash flows, and the business profile. Agribusiness is defined as a sector with high sensitivity to external factors and elevated credit risk, which necessitates a specialized financing approach (Binswanger & Rosenzweig, 1986). In this context, the financial needs of agricultural enterprises are directly dependent on production cycles and can be grouped into several processes.

Key business processes and the factors generating the need for financing are identified. Inventory management is examined as a critical element, encompassing raw material bases, work in progress, and finished goods necessary for production continuity and market realization. Within this process, three interdependencies are highlighted: quality, adequacy, and timeliness. Quality is presented as a prerequisite for production outcomes; adequacy is linked to the avoidance of disruptions caused by shortages; and timeliness is critical due to the limited time windows for technological operations in agriculture.

The second factor concerns investment in long-term productive assets, which entails economic and financial transformation of assets within the balance sheet structure. At the same time, the possibility of alternative forms of asset provision, such as land leasing and operating leasing, is considered, depending on the stage of development of the company and its resource constraints.

The process of marketing and realization of produced output, which represents the final stage of production, is a function of the business model, market positioning, and marketing strategy, and is reflected in the final financial result. The specificity of agribusiness requires decision-making and strategic adaptability in response to the effects of its implementation. It is further emphasized that the capital turnover cycle in the agricultural sector is longer and structured differently compared to other sectors. This results in unpredictable cash flows, which leads banks to apply more conservative structures, higher collateral requirements, and stricter liquidity criteria.

Another important element is technological backwardness, which is associated with greater income instability and financial difficulties, whereas stronger managerial

skills and better organizational structures reduce the likelihood of financial problems in the event of shocks. In addition, weak financial literacy and incomplete accounting practices also act as factors limiting access to financing.

The financial assessment is further complemented by indicators related to yield stability, technological models, seasonality, and dependence on external resources. Consistency in yields and production efficiency reduces risk and increases creditworthiness, while seasonality makes cash flow management critically important. On the other hand, specific factors such as subsidies and insurance function as risk-mitigating mechanisms and income stabilizers, while simultaneously improving liquidity. Managerial determinants, in turn, reduce information asymmetry and positively influence the conditions of bank financing. Institutional determinants, such as banking regulations and collateral markets, define the framework of the credit process, with the development and liquidity of the land market identified as critical for access to credit.

In this context, the integrated analytical models applied by banks are also assessed, in which production processes are viewed as financial drivers influencing future cash flows. From the perspective of enterprises, the main instruments for financing processes include own funds, subsidies, trade credit, advances, leasing, and bank loans. Bank financing retains the most significant role due to its scale, maturity, and predictability of terms.

In summary, business processes encompass specific risks and a system of determinants that shape a complex profile of the agricultural enterprise, on the basis of which banks build their credit decisions. The interrelationship between production cycles, risk, and financing determines the need for a specialized approach to the assessment, monitoring, and structuring of bank financing in the agricultural sector.

In the third paragraph, “Models and approaches for analysis in assessing financing opportunities for processes in the agricultural sector,” the necessity of using models to evaluate the financing capacity of agricultural enterprises is emphasized. These models should take into account sector-specific characteristics, the role of information asymmetry, and the existing risks to lending. The examination of the process begins with the internal assessment of the firm, while the final stage is the

application for credit, in which the bank acts as an independent corrective to managerial decisions. An important conclusion here is that the assessment of creditworthiness cannot rely solely on financial indicators and accounting statements due to limitations in the quality of reporting. This increases the importance of models that combine financial analysis, production logic, risk profile, and information quality.

The framework of Berger & Udell (2006) is presented, demonstrating the relationship between the client’s information environment and the choice of credit technology. This confirms the need for credit assessment in the agricultural sector to combine both financial and non-financial indicators (Figure 1).

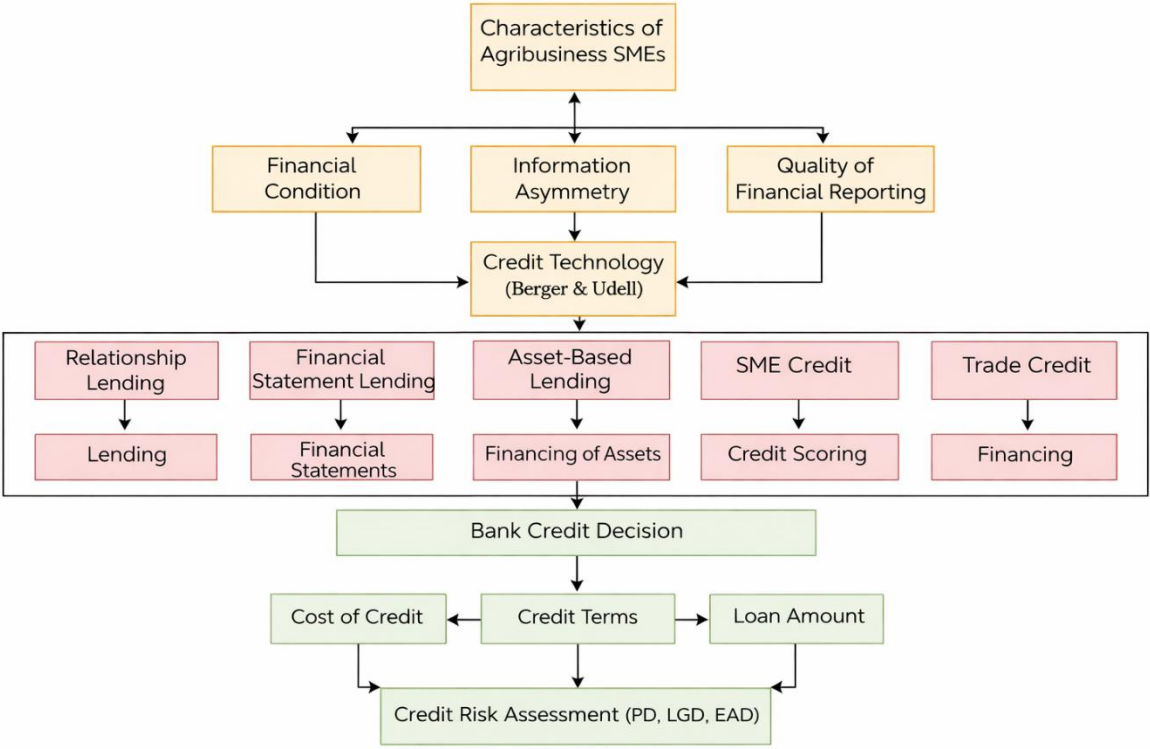


Figure 1. Relationship between the characteristics of agribusiness/SMEs and the bank’s credit decision

Source: Author’s elaboration based on Berger, A. N., & Udell, G. F. (2006)

The higher the quality and standardisability of information about an agricultural holding, the more likely it is that the bank will apply a formalized credit technology and offer predictable terms. In agricultural enterprises, financially oriented lending relies on reliable financial statements. However, there is a significant share of farming activities

and small holdings for which this approach does not yield satisfactory results due to limited transparency and weak accounting discipline.

Considerable attention is also paid to credit risk under conditions of imperfect information. In cases of insufficient transparency and lack of credit history, supporting factors such as higher-value collateral and established historical relationships are applied, along with additional control mechanisms. The need to integrate agricultural specificities into assessment models, rather than treating them as a secondary factor, becomes particularly important. A suitable solution in this direction is the development of a model for assessing access to finance. In this context, the author proposes the CAP-Fin model—a function representing an original, conceptual, and analytical framework that captures access to finance by synthesizing the following factors: production and structural characteristics, financial infrastructure and institutional environment, financial behaviour, Common Agricultural Policy instruments, and managerial factors.

$$\text{CAP-Fin} = f(\text{PS}, \text{FI}, \text{FB}, \text{CAP}, \text{MD}) \quad (1)$$

where: PS – production and structural characteristics (scale, specialization, technological level, biological cycles); FI – financial infrastructure and institutional environment (access to financial intermediaries, regulatory framework, guarantee mechanisms, and competitive environment); FB – farmers’ financial behaviours (risk propensity, preferences between own and borrowed funds, financial literacy, and trust in credit institutions); CAP – instruments of the Common Agricultural Policy (system of direct payments, investment measures, state aid); MD – managerial and digital factors (managerial capacity, strategic planning, and the use of digital technologies).

The proposed model may serve as a basis for more accurate diagnostics and assessment of the effectiveness of the applied support instruments, enabling the formulation of more adequate policies and managerial decisions.

CHAPTER TWO: STUDY OF THE CONTRIBUTION OF BANK FINANCING TO BUSINESS PROCESSES IN THE AGRICULTURAL SECTOR

The second chapter clarifies the contribution of bank financing to business processes in the agricultural sector. Its main point of departure is that the quality of the

business model determines not only access to capital, but also the cost and structure of financing. The seasonality of cash flows, dependence on climatic and price shocks, and the higher capital intensity of production form the basis of this interrelationship. Consequently, a sound business model is not merely a managerial category, but a prerequisite for creditworthiness and for the sustainable financing of all processes.

In subsection 2.1, “Profile of efficient and inefficient business models and their influence on the methods of financing processes in agribusiness,” the analysis examines how financing is influenced by the business model and by whether the holding can demonstrate sustainability, efficiency, and predictability of results. In this regard, international studies indicate that there is no universal formula for a “successful” model; however, enterprises with higher efficiency and sustainability are typically characterized by: (1) systematic innovation and technological upgrading; (2) a well-developed financial function (budgeting, liquidity management, planning); (3) investment in human capital; and (4) strengthening of the commercial function. These characteristics are also applicable to agricultural enterprises in Bulgaria, as they directly improve reporting quality, risk management, and the ability to service liabilities. The study summarizes the key criteria for an efficient and sustainable business model based on the results of expert consultations (Table 1).

Table 1

Criteria for an Efficient and Sustainable Business Model

Criteria	Efficient / sustainable business model
Resource utilization	Effective management of land, water, labor, capital, and production resources through the realization of economies of scale and the use of competitive advantages enabled by market access.
Innovation and technology	Continuous investment in modern technologies to enhance competitiveness, product recognition, and adaptability to market and climate changes.
Social responsibility	Implementation of sustainable practices for environmental protection, decent working conditions, and social responsibility, including the integration of ESG policies.
Management and succession	Professional management, a stable organizational structure, and clear generational succession, particularly in family-owned farms.
Growth strategy and performance management	Development of strategies for sustainable growth through resource pooling and partnerships, supported by the use of KPIs and productivity management.
Market orientation	A business model aligned with market conditions and consumer demand.

Financial sustainability	Financial and economic predictability, long-term relationships with financial partners, and transparent governance.
Economic viability	A practical and economically viable business model operating in a real market environment.

Source: Expert survey conducted by the author

The integration of these elements increases the likelihood of access to bank credit, as it reduces information asymmetry and enables banks to structure financing with lower risk and more flexible terms.

The analysis is further complemented by the regulatory and financial framework that influences banks' behaviour. Following the 2008 financial crisis and the introduction of Basel III, capital requirements increased (Basel Committee on Banking Supervision, 2010). At the same time, exposures to SMEs may be treated with more favourable risk weights under certain conditions in accordance with the Capital Requirements Regulation (CRR), which should, in principle, support lending to small firms. In practice, however, micro-enterprises remain the most constrained and more frequently face credit rejection or self-select out due to unfavourable terms. In this regard, the findings of Fi Compass reports (2020; 2022) identify structural weaknesses and insufficient adaptation of banking products to sector-specific characteristics, as well as a dependence of lending on the receipt of support under the CAP/RDP. Empirical data also indicate a concentration of financial resources in larger exposures (above BGN 250,000 and particularly above BGN 1 million), which is an indicator of polarization: larger holdings more easily transform scale and assets into collateral and access to investment resources, while small enterprises remain more dependent on working capital and short-term financing and face greater difficulties in transitioning toward technological upgrading.

For a more objective assessment of credit intensity, the Agriculture Orientation Index (AOI) is used, where values above 1 indicate lending above the proportional share relative to contribution to GDP (FAO, 2021). For 2024, an AOI value of approximately 2.5 indicates that credit exposure to the agribusiness sector is relatively high. This, however, should be interpreted in the context of several factors: the sector is capital-intensive, dependent on working capital financing and subsidies, and structurally oriented toward primary production with lower value added, which explains a higher

need for external capital relative to its share in GDP. In addition to the characteristics of the credit portfolio, the analysis of the pricing environment of financing provides insight into the conditions under which agribusiness operates. The dynamics of interest rates on business loans in Bulgaria, compared with the movement of the 3-month EURIBOR, show that despite increasing global uncertainty after 2022, interest rate levels remain relatively stable (Figure 2).

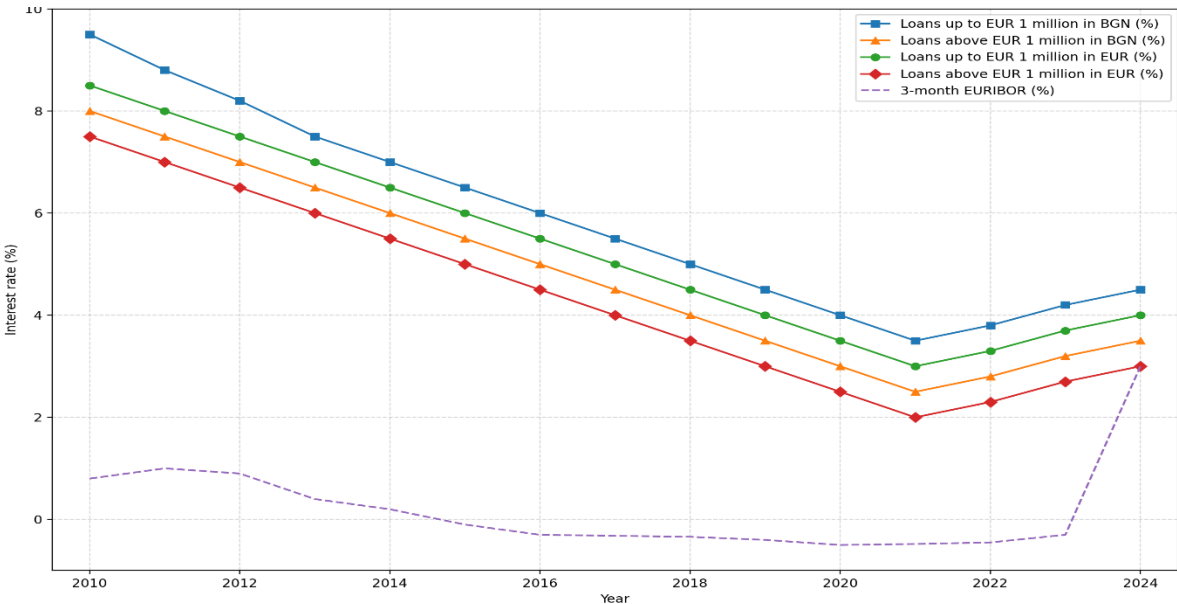


Figure 2. Interest rates on business loans and the 3-month EURIBOR in Bulgaria
Source: Data from the Bulgarian National Bank and the European Central Bank, processed by the author

These interest rate conditions create prerequisites for maintaining credit activity and support the investment intentions of enterprises. However, a stable pricing environment does not automatically lead to uniform access to financing, as loan conditions continue to vary significantly depending on the size of holdings and the quality of financial management.

The effect of the presence or absence of access to financing is directly reflected in the investment activity of the sector, measured by the indicator “Gross Fixed Capital Formation” (GFCF). Data for Bulgaria show an upward trend in recent years, with the share of GFCF relative to value added increasing and reaching levels between 20% and 25% (Figure 3). This indicates intensified renewal of machinery, infrastructure, and the

technological base, which is characteristic of enterprises with higher financial stability and better access to bank financing. Despite this positive trend, investment activity in Bulgarian agriculture remains below the average levels of the European Union, suggesting structural constraints and untapped potential for modernization.

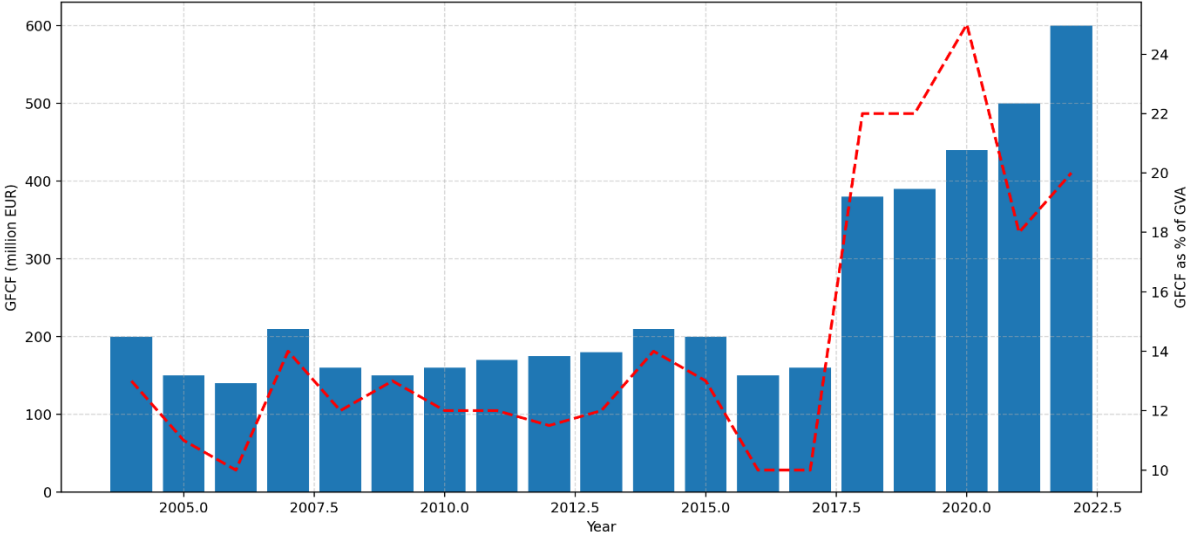


Figure 3. Gross Fixed Capital Formation in Bulgaria

Source: FADN data, processed by the author

At the same time, the maturity structure shows that the share of loans with a maturity exceeding five years in the sector is lower than the average for non-financial enterprises (Table 2), which may be interpreted as a signal of a more conservative approach by banks toward long-term risk.

Table 2

Maturity of Corporate Loans by Sector

Maturity Period by Sector	Thousand BGN	From 1 to 5 years	Over 5 years	Total
Non-financial Enterprises	44 698 054	13,5%	50,5%	64,0%
Agribusiness sector	2 903 260	17,4%	39,2%	56,6%

Source: BNB

The analysis also shows that the investment process in the agricultural sector is highly asymmetric and concentrated mainly in larger enterprises with higher capital intensity. Small and medium-sized enterprises, despite the favourable interest rate

environment, continue to face difficulties in implementing investment projects. The reasons for this are systematized on the basis of expert consultations and summarized in Table 3, which identifies the key factors limiting investment activity and access to financing.

Table 3

Key factors limiting investment activity and access to finance in the agricultural sector

Influencing factors	Characteristics / manifestations	Impact on investment
Limited financial resources	Insufficient own capital among small and medium-sized enterprises	Postponement or inability to invest in fixed tangible assets
Difficult access to finance	High collateral requirements and unfavorable credit conditions	Restriction of investment projects
Low attractiveness to external investors	Regulatory constraints and administrative burden	Lack of strategic and large-scale investments
Structural characteristics of agriculture	Dominance of cereal and industrial crops with low value added	Low need for continuous investment after the initial stage
Dominance of small family farms	Limited scale and capacity for modernization	Low investment activity
Lack of cooperation	Weak participation in cooperatives and producer groups	Inability to achieve large-scale investments and economies of scale
Insufficient state support	Inefficient allocation of subsidies and administrative burden	Diversion of investments to other sectors and activities
Low effectiveness of European programs	Low absorption rates, misallocated investments, and lack of strategic focus	Poor investment decisions and low gross value added (GVA) of the sector
Regulatory uncertainty	Frequent changes in regulations and lengthy administrative procedures	Postponement or cancellation of investments

Source: Author's own elaboration

Polarization in the sector implies the need for a more structured approach and differentiated financial solutions oriented toward the actual cycles and risks in agriculture.

In subsection 2.2, “Study of external and internal factors and their impact on the financing of processes in the agricultural sector,” the impact of macroeconomic and portfolio characteristics on bank financing is analyzed. The processes are also examined under the influence of the specific institutional, market, and production environment in which agribusiness companies operate. Financial decisions in the sector are shaped by a

combination of structural constraints, external macroeconomic and natural factors, as well as internal characteristics related to management, scale, and the financial sustainability of holdings. Empirical and institutional studies (Fi-compass, 2020; 2022) show that access to bank financing in the agricultural sector in Bulgaria remains uneven and highly differentiated. Following the country's accession to the EU, the sector has experienced growth, but it is characterized by pronounced polarization between a limited number of large holdings and a predominant share of small and micro holdings. This necessitates a specialized and segmented approach in the structuring of banking products.

Direct payments under the Common Agricultural Policy play a significant role in incomes and investment activity. They improve liquidity but at the same time distort the real assessment of profitability and are often treated by banks as a primary source for loan servicing.

Additional constraints arise from the seasonality of revenues, the requirement for standard financial reporting that does not reflect the specifics of the agricultural year, and banks' preference for mortgage collateral, which hampers farmers' access to credit. Moreover, low financial literacy and deficits in managerial capacity among some holdings further exacerbate the problem. Based on expert consultations and the systematization of results, the factors influencing the financing of agricultural processes can be classified as external and internal.

External factors include climatic and biological risks, seasonality of cash flows, dependence on subsidies, market conditions and price volatility, technological pressure, and demographic constraints. These factors increase uncertainty and lead to a more conservative banking approach, requiring flexible repayment schemes and specialized products. Their classification and impact are summarized in Table 4.

Table 4

Classification of external factors and their impact on financial condition and access to finance

External factor	Content and manifestation	Impact on financial condition and access to finance
Climatic and biological risks	Adverse weather conditions, diseases, and pests leading to fluctuations in yields and production.	Increase in business risk, unstable revenues, and reduced predictability of cash flows, resulting in a more conservative banking approach.
Seasonality and cyclicity of cash flows	Concentration of revenues in specific periods (post-harvest sales, procurement campaigns).	Need for specialized repayment schemes, working capital, and bridge financing, as standard credit products are often unsuitable.
Dependence on subsidies and public support	Significant share of direct payments and national support schemes in farm revenues, accompanied by limited incentives for efficiency improvements.	Improved liquidity but distortion of actual profitability, with banks frequently treating subsidies as the primary source for debt servicing.
Access to land and the land rental market	Rising prices of agricultural land and rental payments driven by increased competition.	Increase in fixed costs and capital intensity, creating a need for long-term investment financing.
Technological modernization and innovation	Pressure to adopt modern machinery, digitalization, and precision agriculture in order to improve efficiency.	Growing investment requirements and dependence on long-term bank financing, accompanied by higher demands on financial planning.
Labor shortages and demographic factors	Limited access to qualified labor and aging of the workforce in the sector.	Declining production efficiency and rising costs, adding additional risk in the assessment of business sustainability.
Market conditions and price volatility	Volatility in prices of agricultural products, feed, and input resources.	Unstable revenues and margins, leading to higher credit risk and the need for flexible financial instruments and risk management solutions.

Source: Author's own elaboration

Internal factors are directly related to farm management and are decisive for creditworthiness. Larger and well-established holdings demonstrate better financial indicators and a lower perceived risk, which enables them to obtain more favorable financing conditions. The classification of internal factors and their impact is presented in Table 5.

Table 5

Classification of internal factors and their impact on the financial condition and access to finance of agribusiness

Internal factor	Content and manifestation	Impact on financial condition and access to finance
Size and economic scale of the farm	Cultivated area, production volume, turnover, and asset size.	Larger farms have better access to bank financing, lower borrowing costs, and a wider range of financial instruments.
Production structure and specialization	Grain and vegetable production, livestock farming, permanent crops, and mixed production.	Differences in capital intensity and risk profiles across subsectors lead to differentiated banking approaches and financing terms.
Stage of farm development	Start-up, growing, or established enterprise.	Start-up and young farms face higher risk and limited access to credit due to the lack of credit history and accumulated capital.
Financial sustainability and profitability	Ability to generate profit from core operations, including without reliance on subsidies.	Higher profitability improves creditworthiness and reduces dependence on external support.
Liquidity and cash flow management	Existence of temporary liquidity shortfalls.	Well-managed cash flows facilitate debt servicing and reduce credit risk.
Capital structure and indebtedness	Ratio of equity to borrowed capital.	High levels of indebtedness constrain access to new financing and result in stricter lending conditions.
Collateral availability and asset structure	Availability of land, buildings, machinery, and other assets suitable for collateral.	Insufficient or inadequate collateral is a key reason for financing refusal or limitation.
Quality of financial reporting	Accuracy, timeliness, and transparency of financial statements.	High-quality financial reporting improves risk assessment and facilitates access to bank loans.
Managerial capacity	Skills in planning, budgeting, and cost control.	Low financial literacy increases the risk of inefficient decisions and complicates relationships with banks.
Quality of business planning	Realism of business plans and investment calculations.	Well-structured business plans increase the likelihood of financing approval.
Credit history and financial discipline	Previous credit experience and regular servicing of obligations.	A positive credit history is a key factor in building trust with banks.
Managerial experience and succession	Managerial experience, involvement of young farmers, and intergenerational transition.	Experienced management enhances business resilience and reduces perceived credit risk.

Source: Author's own elaboration

The analysis of lending dynamics reveals a clearly pronounced negative relationship between interest rates and the volume of bank financing in the agricultural sector. The decline in interest rate levels after 2007 led to a significant increase in the

use of financing, reflecting changes in the regulatory and macroeconomic environment (Figure 4).

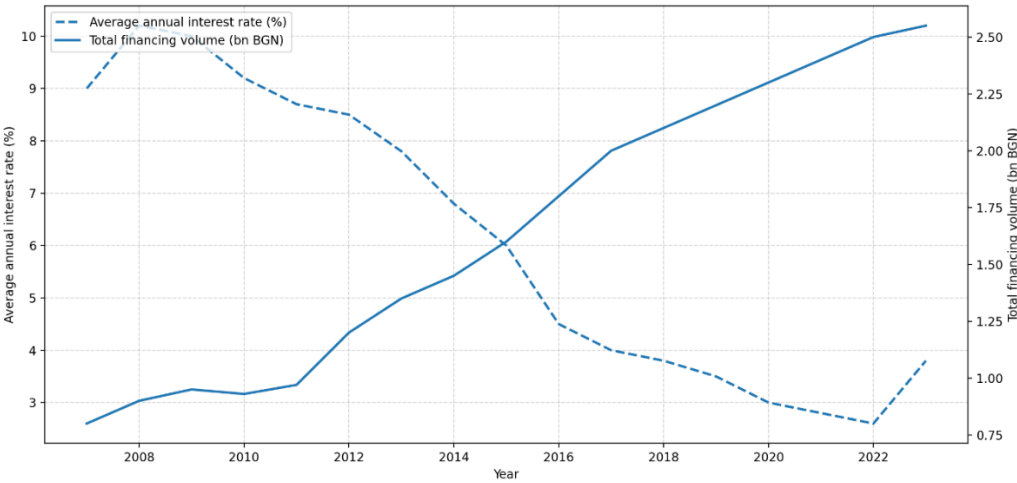


Figure 4. Average annual interest rate and volume of agribusiness financing

Source: Bulgarian National Bank data, processed by the author

At the same time, investment activity in the sector remains high, supported by Rural Development Programme (RDP) schemes and growing investments in fixed assets. The increase in deposits in the sector (Figure 5) is an indicator of the concentration of own capital in a limited number of larger holdings, which further deepens polarization in access to financing.

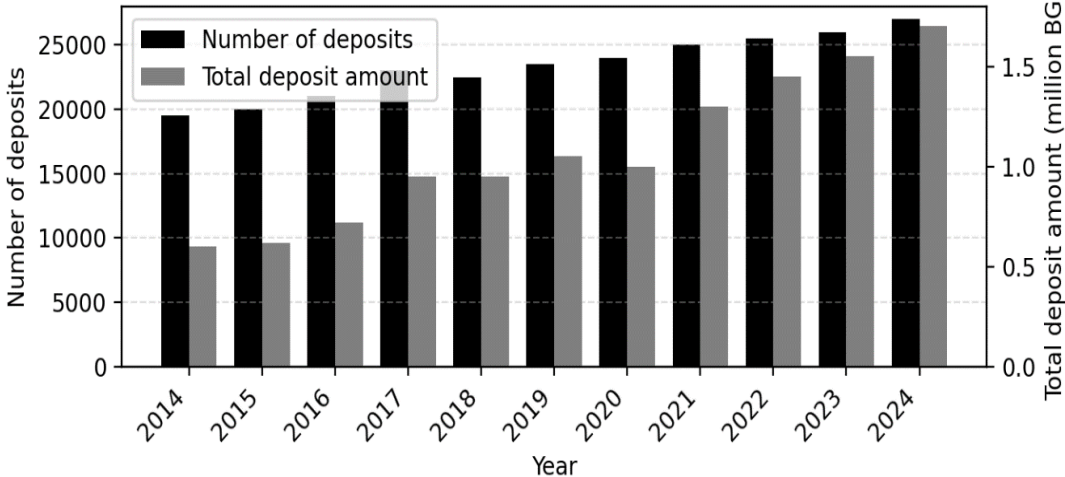


Figure 5. Dynamics of the number and total amount of deposits in the agricultural sector

Source: Data from the Bulgarian National Bank, processed by the author

The study demonstrates that the financing of processes in agribusiness is shaped by the influence of a complex system of external and internal factors. Therefore, sustainable financing requires a process-oriented and differentiated approach, aligned with the specific characteristics of the agricultural sector, the scale of holdings, and the cyclicity of production.

In subsection 2.3. “Study of bank financing and its impact on processes in agribusiness” the data from the conducted survey are analyzed and the hypotheses regarding bank financing are tested. Bank financing is examined as a factor providing resources that shape enterprise behavior and influence the choice of technological solutions, investment horizon, and the sustainability of production chains. The financial provision of agricultural processes is also of key importance for food security and the sustainable functioning of food supply chains. This is обусловено by the seasonality of revenues, long production cycles, and high exposure to climatic and price shocks, which require a specific approach to liquidity and capital. In this sense, the need for an integrated financial strategy is directly linked to risk management and the creation of buffers to compensate for the time lag between production costs and revenues from sales.

From a practical perspective, the credit strategy of agricultural enterprises should be viewed as a tool for maintaining process continuity and as a mechanism for choosing behavior under uncertainty. Key parameters for financing conditions include profitability, liquidity, risk profile, and the capacity to generate cash flows sufficient to service debt and related costs. Empirical results confirm the dominant role of working capital financing as a prerequisite for the stability of ongoing processes. According to the survey, 62.2% of respondents used bank products for working capital financing over the past three years, most commonly credit lines and working capital loans, including those secured by subsidies or inventories. This is consistent with expert opinions that, in the Bulgarian market, the main instruments for current operations are working capital loans, which allow adaptation to seasonal liquidity needs.

The effect of specialized financial products lies in their use for overcoming liquidity shortages and managing supply chain risk. Sale-and-leaseback arrangements, for example, allow the mobilization of capital from already owned assets while

preserving their operational use. Supply chain financing, on the other hand, can mitigate seasonal fluctuations and maintain higher capital efficiency. Factoring contributes to improved liquidity and reduced risk of delayed payments, making it a suitable product for smoothing relationships along the vertical production chain.

A separate focus is placed on investments in agricultural land as a strategic asset and collateral. Fi-compass (2019) estimates the investment financing gap in Bulgaria at between EUR 157–492 million, with approximately 76% of the “financing gap” concentrated in small holdings under 20 hectares. This empirically supports the thesis that medium and large enterprises face fewer difficulties in raising capital, while small holdings have structurally limited access.

For the purposes of the abstract, the economic logic of the “purchase versus lease” decision and the influence of interest rate levels are visualized (Figure 6). The analysis shows that beyond a certain point, acquiring land through credit may be economically justified, especially in conditions of declining interest rates and rising rental payments.

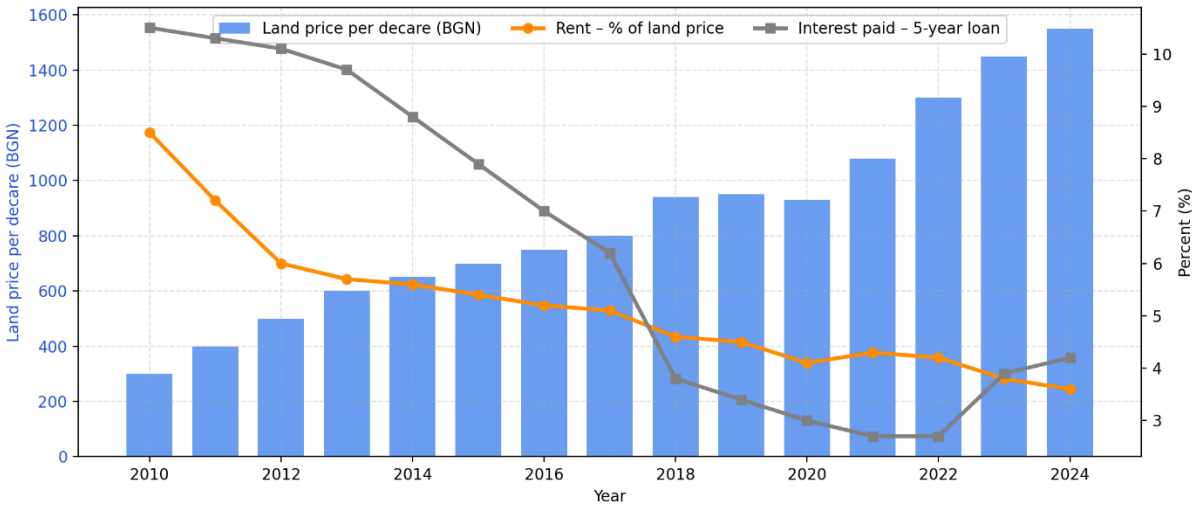


Figure 6. Percentage change in loan interest rates and agricultural land rent

Source: Data from the NSI, BNB, and the author’s own calculations

This relationship is systematized through a “break-even point” model, which demonstrates under which combinations of land price, rent, and interest rate the investment loses its economic rationale (Table 6). The conclusion is that at a certain

interest rate level (for example, around or above 5%), the advantage of purchasing land is significantly reduced.

Table 6

Break-even model for the purchase of agricultural land

Years	Price per hectare (EUR)	Rent per hectare (EUR)	Valuation of 10 hectares (EUR)	Average interest rate (%)	Interest payments relative to 2010	Interest payments YoY	Rent payment
2010	1395	120	13 950	10,2	1422	1422	1200
2011	2065	150	20 850	10	1398	1398	1500
2012	2780	180	27 800	9,4	1315	1947	1800
2013	3105	195	31 050	8,3	1181	2313	1950
2014	3540	213	35 400	7	977	2174	2134
2015	3805	222	38 050	6,2	885	2195	2220
2016	3850	220	38 500	4,8	844	1758	2200
2017	4350	235	43 500	4,8	505	1434	2350
2018	4900	250	49 000	3,4	473	1475	2500
2019	5285	245	52 850	3,2	448	1668	2450
2020	4765	220	47 652	2,78	198	1325	2190
2021	5502	261	55 015	2,39	170	1315	2601
2022	6672	312	66 724	2,52	180	1681	3118
2023	7444	312	74 444	4,03	287	3000	3118
2024	7879	302	78 790	4,31	307	3396	3016

Source: Data from the NSI, BNB, and the author's own calculations

In this part of the dissertation, the instruments of the Common Agricultural Policy (CAP) and EU financial instruments are also examined as mechanisms for risk reduction and improved access to capital. The European Investment Fund (2023) emphasizes that CAP instruments for the 2023–2027 period can support the sector through loans, guarantees, and risk capital. Ferrara, Ivanova, and Scandizzo (2024) identify a positive and statistically significant effect of investments under the European Agricultural Fund for Rural Development (EAFRD) on economic activity and private investment at the regional level, without crowding out private financing. Despite this potential, the empirical data in the dissertation show that access to and the impact of subsidy-based products remain limited. Out of approximately 65,057 registered farmers and around 14,370 credit users ($\approx 22\%$), expert estimates indicate that no more than about 5,000 farmers use financing secured by subsidies. The main barriers remain cumbersome documentation procedures, uncertainty regarding payment schedules from the State

Fund “Agriculture,” and low coverage relative to actual production costs (on the order of 10–20%). The European Commission (2022) is cited as a basis for the conclusion that delays and administrative obstacles reduce the effectiveness of this type of instrument. Institutional constraints are even more pronounced with regard to investment measures under the Rural Development Programme, where bureaucratization and delays in evaluation and payments lead to uncertainty, especially for small and medium-sized holdings (MAF, 2023). As a result, larger and more financially stable holdings have a comparative advantage in absorbing support and transforming it into effective investment, which further intensifies polarization.

A critically important result concerns business satisfaction assessments, with Net Promoter Scores (NPS) of –28 for access to bank credit and –27 for the impact of direct payments on facilitating financing. These values indicate a persistent perception of insufficiency and a mismatch between formal support mechanisms and the real needs of agribusiness. Fi-compass (2020) likewise demonstrates that administrative burden, lack of awareness, and limited capacity hinder the effective use of financial instruments.

The analysis confirms the thesis that bank financing is not a neutral resource, but a mechanism that influences the structure and quality of processes by stabilizing liquidity and enabling modernization and expansion; however, its effect is highly differentiated according to the scale, asset base, transparency, and managerial competence of holdings. Polarization is reinforced by uneven access to investment programs and the administrative burden associated with CAP/RDP measures, as confirmed by both expert opinions and negative NPS assessments.

Within the framework of the study, the formulated research hypotheses are also tested on the basis of the survey results and the analysis of empirical data. The findings reveal clear relationships between the characteristics of agricultural enterprises and the use of bank financing, allowing the main research assumptions to be confirmed.

Hypothesis 1 is confirmed, as the analysis shows that larger agricultural holdings use bank financing more frequently, primarily directed toward investments in fixed assets, while smaller holdings rely mainly on own funds and trade credit.

Hypothesis 2 receives empirical confirmation in that agricultural producers with longer managerial experience demonstrate a higher propensity to use investment and

long-term bank loans. The perceived high cost of bank financing exerts a constraining effect on the use of credit resources, particularly among smaller holdings.

Hypothesis 3 is also confirmed, according to which specialized banking products for agribusiness are perceived as more appropriate due to flexible repayment schedules and tailored collateral arrangements aligned with seasonality (see Figure 7).

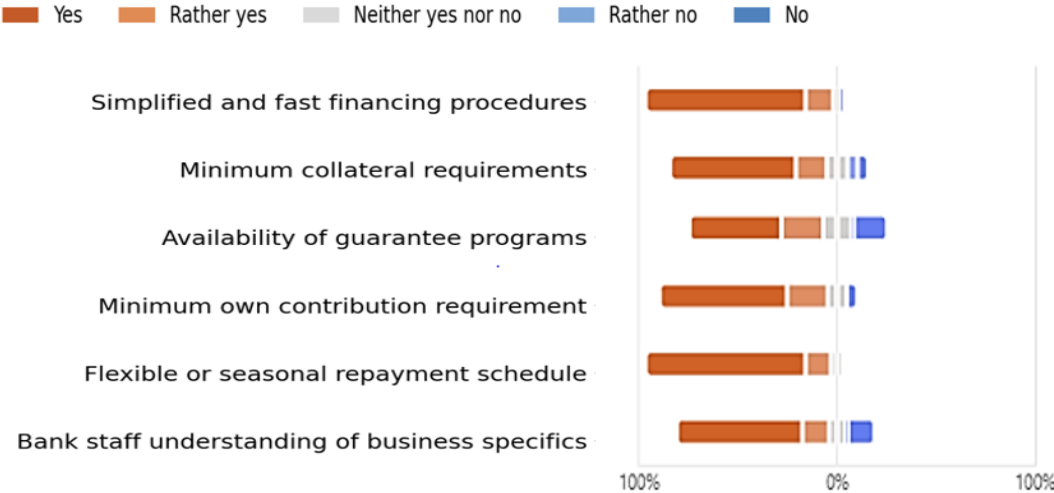


Figure 7. Which characteristics of specialized banking products make them more suitable for financing agribusiness processes?

Source: Author’s own survey

Hypothesis 4 is confirmed by the identified positive impact of direct payments under the Common Agricultural Policy on access to bank financing. The data indicate that for holdings implementing new technologies and sustainable practices, the effect on creditworthiness and investment activity is stronger.

In the second chapter, it is confirmed that bank financing is a key factor for the sustainability and modernization of agricultural enterprises; however, its effect is highly differentiated depending on scale, the quality of the business model, financial discipline, and managerial capacity. Empirical data and the confirmed hypotheses show that small and medium-sized holdings remain structurally constrained in their access to investment resources, which deepens polarization within the sector. This substantiates the need for more effective financial instruments tailored to seasonality, risk profiles, and sustainable development objectives.

CHAPTER THREE: GUIDELINES FOR IMPROVING APPROACHES TO FINANCING BUSINESS PROCESSES IN AGRIBUSINESS THROUGH BANK CREDIT

The third chapter formulates guidelines for the selection and structuring of bank financing for key processes in agribusiness. The starting thesis here is that universal financial solutions are ineffective in the agricultural sector, as agricultural enterprises differ in legal form, scale, asset base, administrative capacity, seasonality of cash flows, and risk exposure. Therefore, the optimal financing approach should be personalized and aligned with the business structure and investment profile of the holding, as well as with external institutional and market constraints.

The analysis in Section 3.1, “Identification of determinants for selecting an approach to financing processes in accordance with the company’s business structure,” is based on the need for a “starting point” in financial planning that integrates: (1) an understanding of the internal needs and capacity of the business; (2) consideration of the external economic environment and regulatory conditions; and (3) selection of an appropriate financing model consistent with production cycles and investment objectives. Empirical observations show that a significant share of Bulgarian agricultural producers lack a consistent financial strategy. Small holdings (with turnover below BGN 1,000,000) often combine financial products piecemeal from various sources such as loans, leasing, trade finance, and others. This is particularly evident among micro and small producers (up to BGN 200,000), where managerial and operational functions are merged, administrative capacity is limited, and financial decisions are often made intuitively. Within this framework, bank officers and/or external experts become key “mediators” of financial culture and planning.

On this basis, the main structural determinants that predetermine the choice of financing instruments and their parameters are identified:

(1) Legal form influences access to credit, eligibility for programs, and the transparency of financial reporting. It is observed that larger holdings, predominantly organized as commercial companies and cooperatives, have a higher capacity to use external capital, which is also associated with more developed organizational structures and reporting practices. This is illustrated by the distribution of labor resources (AWU)

relative to legal status and the size of utilized agricultural area (UAA), showing a concentration of personnel and a higher degree of formalization in larger holdings (Figure 8).

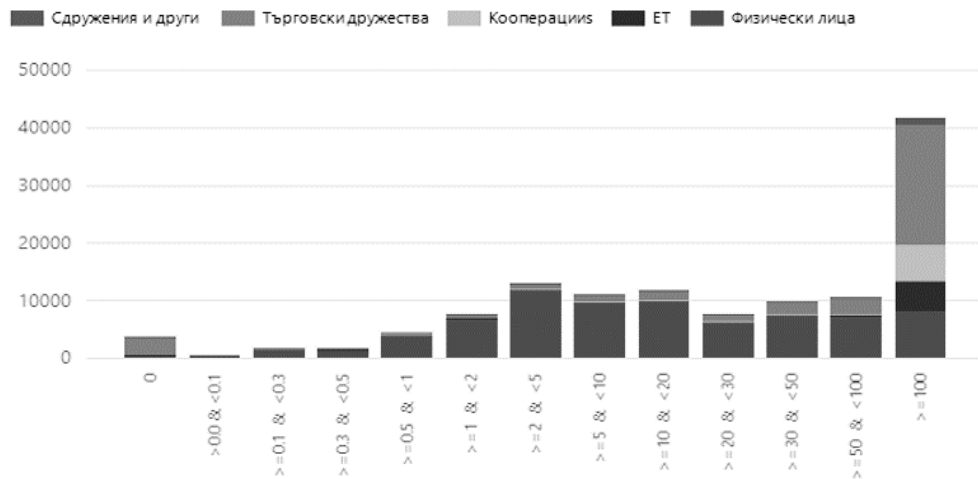


Figure 8. Distribution of AWU of permanently employed persons by farm size (UAA, ha) and legal status of farms

Source: Ministry of Agriculture and Food (MAF)

(2) The scale of activity should be considered multidimensional, not only in terms of land area or turnover, but also with regard to land-use structure, the volume of subsidies, permanent employment, and legal form. Data from holdings with large economic size show significant average levels of borrowing, which indirectly confirms the relationship between scale and access to long-term capital.

(3) The share of owned land performs a dual function: (a) it reduces the structural cost of rent and frees resources for investment; (b) it increases the asset base and collateral capacity. In the chapter, this effect is formalized through a model of annual and cumulative investment capacity based on profit/rent and the share of owned land:

$$\mathbf{I\ Total = T \cdot (A \cdot P + A \cdot s \cdot R)} \quad (2)$$

where: I_{total} – accumulated investments over T years; A – total area; P – profit per hectare; R – rent per hectare; s – share of owned land. The practical interpretation is that an increase in s leads to a “linear” growth of investment potential without additional

changes in operating profitability. This expands the possibilities for mechanization, expansion, the adoption of technologies, and sustainable practices.

(4) Subsidies and grants are critical for liquidity and investment activity. The chapter argues that external expertise increases absorption capacity and indirectly enhances creditworthiness through improved documentation and planning. Investment capacity is expanded by public resources:

$$I = A \cdot P + A \cdot s \cdot R + A \cdot Sd + Sg \quad (3)$$

where: A – cultivated agricultural area; P – net profit per hectare; R – saved rent per hectare; S – share of owned land; Sd – direct payments per hectare; Sg – grants absorbed through projects. The illustrative calculation in the text shows that, under realistic parameters, subsidies can increase investment capacity by more than two times compared to self-financing.

(5) Human resources and administrative capacity are indicators of organizational maturity and the ability to manage projects, reporting, and control. Small holdings managed by self-employed individuals face higher administrative barriers and are perceived as riskier by creditors. Therefore, scale is also summarized as an index integrating turnover, owned land, subsidies, personnel, and legal form:

$$M = \alpha1 \cdot T + \alpha2 \cdot S + \alpha3 \cdot U + \alpha4 \cdot L + \alpha5 \cdot F \quad (4)$$

This index makes it possible to conceptualize a “creditworthiness scale” through the structure of the business, rather than relying solely on individual financial indicators.

(6) Financial history and creditworthiness are considered as a function of financial performance, assets/collateral, credit discipline, and quality of management. In this context, the key indicators used by banks in risk assessment are systematized (Table 7).

Table 7

Indicators for determining creditworthiness

Indicator	Scope description	Acceptable value
Net sales revenue	Volume of activity	Growing or stable
Profit	Profitability	Positive

EBITDA	Operating profit before depreciation	> 6 % of turnover
Debt/Equity (liabilities / equity)	Financial stability	< 1.5
Liquidity (Current Ratio)	Coverage of current liabilities	> 1.2
Credit history	Overdues, declared insolvency	No incidents
ROA (Return on Assets)	Return on assets	> 5%
ROE (Return on Equity)	Return on equity	> 10%
Interest Coverage Ratio	Ability to cover interest expenses	> 2.0
Net Profit Margin	Net profit margin	> 3 %
Operating Cash Flow	Cash flow from operating activities	Positive and stable
Inventory Turnover	Inventory turnover rate	Higher is better
Asset Turnover Ratio	Efficiency of assets in generating revenue	> 0,5
Working Capital Ratio	Availability of working capital	> 1.0
DSCR (Debt Service Coverage Ratio)	Ability to service debt (overall)	> 1.25

Source: Author's classification based on regulatory requirements for credit risk assessment and established practice in financial analysis and credit scoring

A significant contribution in this section is the demonstration of the limitations of “standardized” financial analysis in agribusiness due to seasonality and the choice of timing of product realization, which may temporarily deteriorate accounting indicators despite economically rational behavior. This is illustrated through a developed model with two scenarios: sale “on green” (liquidity at T0) versus holding production financed by a bank loan (higher potential at T1). In this case, identical business decisions lead to opposite assessments by financing institutions within the same reporting year (Figure 9), which necessitates an approach and emphasis focused on cash flows and the production cycle.

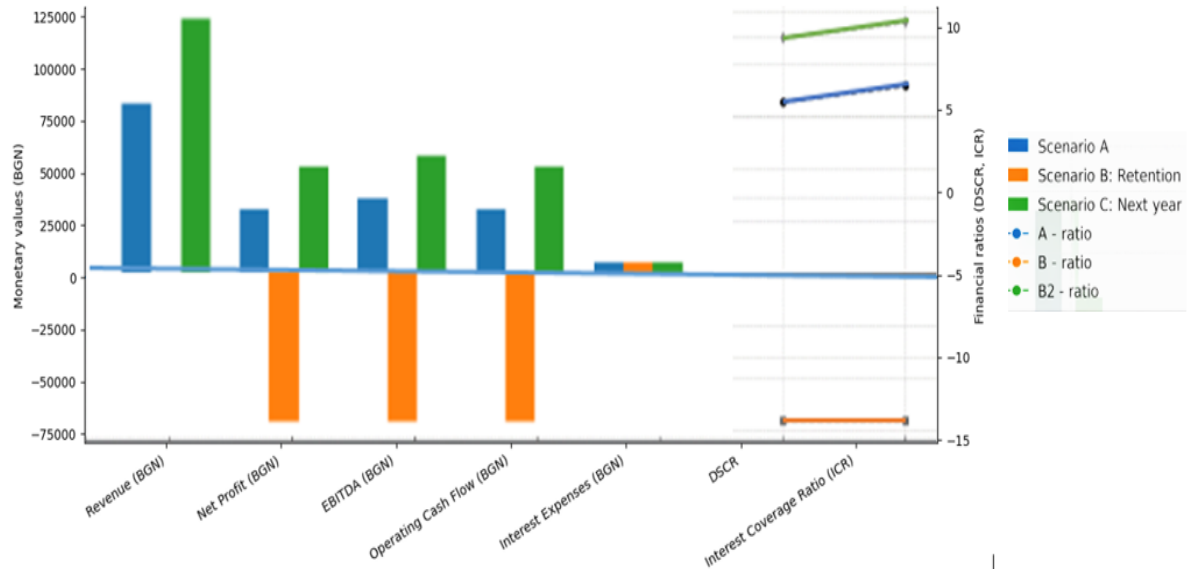


Figure 9. Financial indicators under two scenarios for product realization

Source: Author's own survey

(7) The investment profile summarizes the type, volume, horizon, and rate of return and “translates” the investment into an appropriate financing instrument. The main conclusion is that a mismatch between the **financing maturity** and the **payback period** is one of the frequent causes of liquidity pressure and hidden costs.

The main scientific contribution in this section lies in the systematization of structural determinants—legal form, scale, share of owned land, subsidies, administrative capacity, financial history, and investment profile. Their formalization through models, relationships, and an index allows for more precise segmentation of holdings and the selection of appropriate financing instruments and parameters.

In subsection 3.2, “Model for improving the efficiency of financing enterprises in the agricultural sectors” a model is presented for enhancing the efficiency of financing processes in agribusiness. The starting premise is that, in the agricultural sector, classical accounting and financial analysis is necessary but insufficient due to seasonality, price and cost volatility, climatic risk, and high dependence on public support. Therefore, an integrated framework is required that: (1) optimizes the institutional process of investment support; (2) introduces benchmark models to standardize assessment; and (3) reduces information asymmetry and accelerates the credit process. The core thesis is that financing efficiency in agribusiness is increased through a combination of

institutional reform and technological/analytical upgrading (benchmark models for costs, revenues, and risk), enabling more accurate credit structuring and more sustainable exposure management.

A scenario is proposed for a **hybrid institutional model** in which part of the functions related to the preliminary assessment of investment projects are transferred from the State Fund “Agriculture” (SFA) to commercial banks, without altering the strategic framework of the Ministry of Agriculture and Food (MAF). In this arrangement, MAF retains its role in setting priorities and policy; banks assume responsibility for assessing economic viability, credit risk, and financing structuring; and SFA retains control, payment, and monitoring functions. The rationale for this change is that existing approaches in Bulgaria lead to delays, lower absorption rates, and weak alignment between public resources and market logic. Elements of the local approach (LEADER/CLLD) indicate that decentralized assessment can function, yet administrative burden and low absorption remain issues. The report of the European Evaluation Helpdesk for the CAP (2024) identifies serious constraints and low levels of actual absorption by the end of 2021, supporting the need for a qualitatively different mechanism. Applying banking viability criteria limits the financing of formally eligible but economically weak projects and reduces the risk of inefficient investments.

Institutionally, the allocation of functions in the hybrid model is structured through a three-stage process: (1) preliminary project and credit assessment, including analysis of the business model, cash flows, risk, collateral, eligibility, and sustainability; (2) approval and financing by banks; and (3) control, payment, and monitoring by SFA. For the model to function effectively, participation of more banks is required, along with the establishment of specialized units with sector expertise within commercial banks and clear rules for interaction and data exchange among MAF, banks, and SFA (Figure 10).

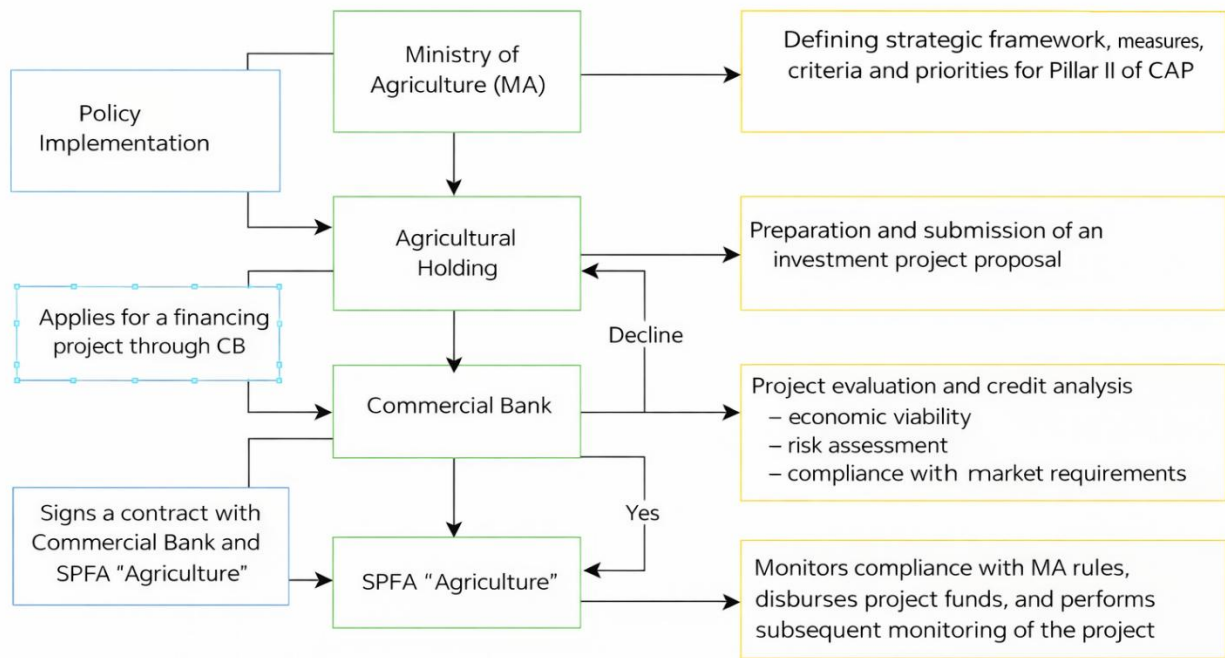


Figure 10. Hybrid institutional model for management and financing of investment projects by commercial banks under Pillar II of the Common Agricultural Policy

Source: Author's own development

The main scientific contribution in this section lies in the proposal of a hybrid institutional model for the management and financing of investment projects, which allocates functions among the Ministry of Agriculture and Food (MAF), commercial banks, and the State Fund “Agriculture” (SFA). The preliminary economic and credit assessment conducted by banks, followed by control, payment, and monitoring by SFA, is intended to accelerate the process, reduce information asymmetry, and enhance the efficiency and sustainability of investment support.

The implementation of a system of benchmark models is also proposed, serving as a common framework for more precise assessment of creditworthiness under seasonal and cyclical fluctuations. This includes structuring banking products according to business profiles, standardizing cost and revenue expectations by crops and activities, as well as early identification of deviations and additional risks. Benchmark models perform a dual function for banks: on the one hand, they accelerate analysis, and on the other, they reduce information asymmetry by providing reference points for efficiency, working capital needs, and the optimal financing structure.

The main types of benchmark models discussed are:

(1) **Financial–accounting model (basic benchmark)**, which is based on financial statements, liquidity, capital structure, and debt servicing capacity. Langkamp (2014) emphasizes the importance of structured credit risk management through data and models, which ensures comparability and control. Its main limitation is the insufficient reflection of biological and climatic factors, as well as business model diversification.

(2) **Investment profile model (strategic benchmark)**, which assesses the horizon, volume, and return on investments in land, machinery, and buildings. Boehlje, Roucan-Kane, and Bröring (2011) discuss strategic frameworks for long-term investment decisions in agribusiness, applicable as benchmarks for comparability and optimization of investment policy. A limitation of this model is the requirement for reliable forecasts and consideration of economic cycles.

(3) **Agri-SME standard (specialized benchmark model)**, which extends classical models with a framework for small and medium-sized holdings (Figure 11). This model integrates production and sector-specific factors and allows assessment under conditions of limited accounting data and high information asymmetry.

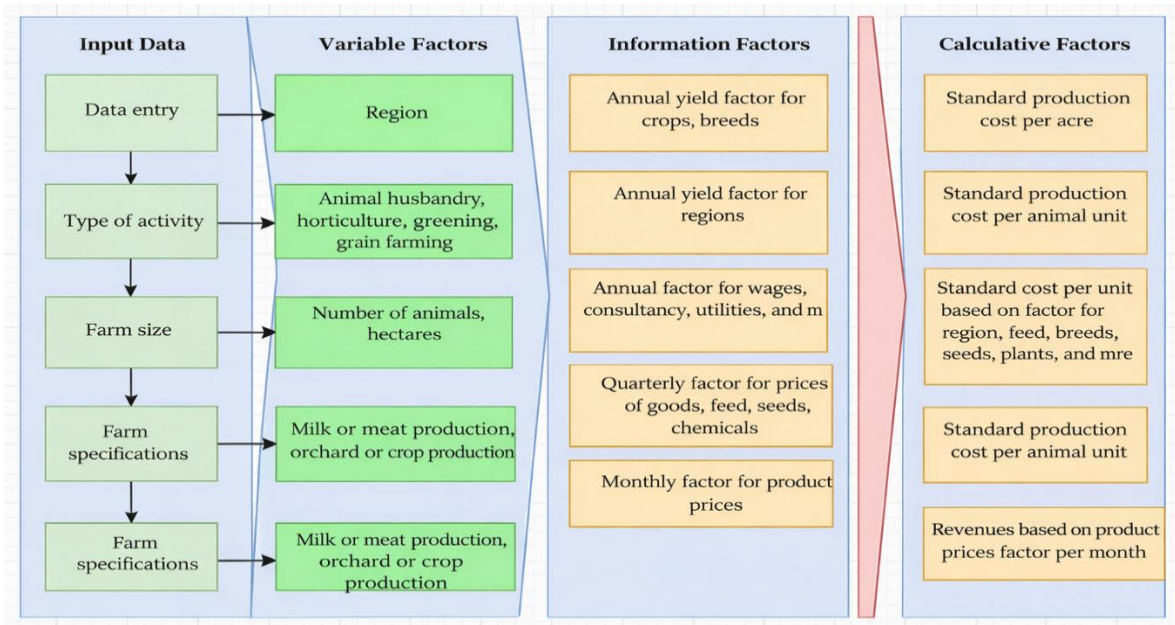


Figure 11. Conceptual scheme of benchmark analysis for generating standard revenues and costs

Source: Author’s own development

The data and the operationalization of the model are structured into several core components, namely:

- Technological sheets, which are used as a basis for estimating standard costs by crops and production lines, accounting for labor inputs (man-days), fuel consumption, fertilizer and pesticide application rates, and expected yields (Figure 12). A key limitation is the need for regular updating to reflect technological advancements and actual farming practices.

HEATED AND UNHEATED FACILITIES			
MODEL FOR PRESENTING THE COSTS OF CONVENTIONAL PRODUCTION OF CUCUMBER, TOMATO, AND PEPPER IN HEATED AND UNHEATED FACILITIES, UNDER THE FOLLOWING SAMPLE TECHNOLOGIES			
MODEL FOR PRESENTING THE COSTS OF CULTIVATING 10 DECARES OF CUCUMBERS IN AN UNHEATED FACILITY, APRIL–JULY, GROWN USING THE CONVENTIONAL PRODUCTION METHOD			
Initial data for development			
TECHNOLOGY FOR CULTIVATION IN AN UNHEATED GREENHOUSE – EARLY PRODUCTION			
Soil-based cultivation			
Seedling production	27.02-30.03		
Planting / Transplanting	01.04-15.04		
Harvesting	25.05-10.07		
Family: Cucurbitaceae.	Crop: CUCUMBER	Cucumis sativus L.	Type: Long-fruited
Area and production parameters			
Area	10,00 decare		
Sowing / Transplanting period	Mart 2 023		
Production system	Conventional	Intensive	
Number of plant protection treatments - 15			
Irrigation and harvesting conditions			
Irrigated			
Harvesting conditions	100%	manual	16 000,00 kg/dec
	0%	mechanized	0,00 kg/dec
Cultivation system			
	0,90 m	0,68 m	1 row
Number of plants per area	1 634 plants/decare	16 340 plants/hectar	
Linear meters	1 111 meters/decare	11 111 meters/hectar	
Number of plants per area	1 634 plants/decare	16 340 plants/hectar	
Expected yield per decare	16 000,00 kg/plant	9,79 kg/plant	

Figure 12. Technological chart for conventional greenhouse production – heated and unheated facilities

Source: Ministry of Agriculture and Food (MAF)

- Statistical data, expressed in index-based and/or absolute prices for outputs and inputs from the National Statistical Institute (NSI), allow for regular updating of model parameters and for capturing price fluctuations on a periodic basis (quarterly, annual, or historical).
- Cost standardization through the use of crop-specific technological sheets and a normative cost framework (Table 8).

Table 8**Technological chart for cereal crops wheat**

Nº	Operation	Cost type	Value (BGN)
1	Nitrogen fertilizers	Fertilizer	16,4
2	Fertilization	Fuel	1,72
3	Ploughing	Fuel	6,15
4	Cultivation	Fuel	3,51
5	Seeds	Seeds	17,85
6	Sowing	Fuel	1,72
7	Pesticides	Products	1,2
8	Rolling	Fuel	0,37
9	Vegetation fertilization	Fuel	1,72
10	Potassium and phosphorus fertilizers	Fertilizer	10,61
11	Spraying	Fuel	1,72
12	Herbicides	Products	2,1
13	Insecticides	Products	8,4
14	Harvesting	Fuel	2
		Total cost	75,47

Source: Author's own elaboration

• Adjustment factors and an acceptable deviation threshold (e.g., 20%) are determined by macro- and microeconomic factors (Table 9), including inflation, labor market conditions, subsidies, scale of production, technologies, regional characteristics, and organizational structure.

Table 9

Macroeconomic and microeconomic factors affecting the acceptable threshold of deviations in the analysis of results

Data level	Factor group	Specific indicators / elements	Main data source
Macroeconomic	Price and inflation environment	Inflation processes, price fluctuations of raw materials, inputs, and energy.	NSI, BNB, Eurostat
	Labour market	Average wage level, social security burdens, availability and shortage of labour.	NSI, MLSP
	State and public support	Direct payments, aid and subsidies, payments under the CAP.	MAF, SFA, Eurostat
Microeconomic	Farm scale and structure	Farm size, utilised agricultural area, number of livestock.	Survey research, accounting data
	Technological level	Machinery used, level of mechanisation and automation.	Survey research
	Production conditions	Regional characteristics, climatic and soil conditions.	Survey research, NIMH

	Production technology	Intensive, extensive, organic, mixed.	Survey research
	Business model and organization	Organisational structure, diversification, vertical integration.	Survey research
	Biological factors	Breed and genetic characteristics of livestock.	Survey research, farm documentation
	Production method	Pasture-based, free-range, industrial, etc.	Survey research

Source: Author's own elaboration

- Regional coefficients and factors that affect yield-related revenues and realized market prices, which should be modeled using indices and multi-year averaged values (Table 10).

Table 10

Regional factor coefficient

Region	Wheat	Barley	Sunflower	Maize	Rapseed	Land rent
Vidin	0,71	0,73	0,91	0,63	1,2	0,66
Blagoevgrad	0,73	0,76	0,79	0,63	1,01	0,37
Burgas	0,93	0,95	0,95	0,85	1,05	0,71
Varna	1,03	1,25	1,15	1,01	1,25	1,29
Plovdiv	1,19	1,05	1,18	1,04	0,95	1,03
Vidin	1,04	0,86	1,05	0,78	0,9	0,68
Vratsa	1,09	1,01	0,84	1,01	0,97	0,92
Dobrich	1,14	1,19	1,08	1,01	0,98	2,03

Source: Author's own elaboration

- Auxiliary tables (Table 11) containing factors for the integration of cost and revenue coefficients and scenario parameters (land area, crops, machinery, and marketing/realization period).

Table 11

Cost and revenue factors and coefficients for calculations

Category	Unit	Weath	Barly	Sunflower	Maize	Rapseed
Seeds	BGN/kg	0,4	0,1	15	5	0,85
Seeds	kg/decare	25	21	0,6	1,5	11
Fertilizer	N (Apr–Mar)	20	20	10	10	10
Fertilizer	P+K (Sep–Dec)	10	10	10	10	10
Fertilizer	NPK (Apr–Mar)	15	15	15	15	15

Products	Seed treatment	0,1	0,1	0	0	0
Products	Insecticides	0,2	0,2	0,2	0,2	0,2
Products	Herbicides	0,05	0,05	0,33	0,25	0,2
Products	Unit	0	0	0	0	0

Source: Author’s own elaborationom and NSI

The model can be implemented as an Excel-based tool or platform which, upon input of data related to region, land area, crops, and technologies, generates projected revenues and costs and validates declared results. This supports:

- determination of actual working capital requirements;
- development of more reliable cash flow projections;
- identification of potential inconsistencies (including informal sales or accounting weaknesses);
- assessment of complex family- or group-based structures (distributed revenues and costs).

Further development toward an AI-based system for relative assessment and recommendations is feasible, with the potential to reduce subjectivity and simultaneously process financial and non-financial data. Harvard Business Review (2025) highlights the potential of AI to reduce human bias in evaluative processes. In this context, the comprehensiveness of the model is demonstrated through its representation within a multifactor system (Figure 13), which provides a complex set of benchmark indicators grouped into five categories: production and structural; financial and economic; technological and ESG sustainability; institutional factors; and banking risk parameters (PD, LGD, EAD, pricing, and product adequacy).

The model allows for cluster-based weighting and classification of access to financing (<50 restricted; 50–65 conditional/high-cost; 65–80 good; >80 preferential).

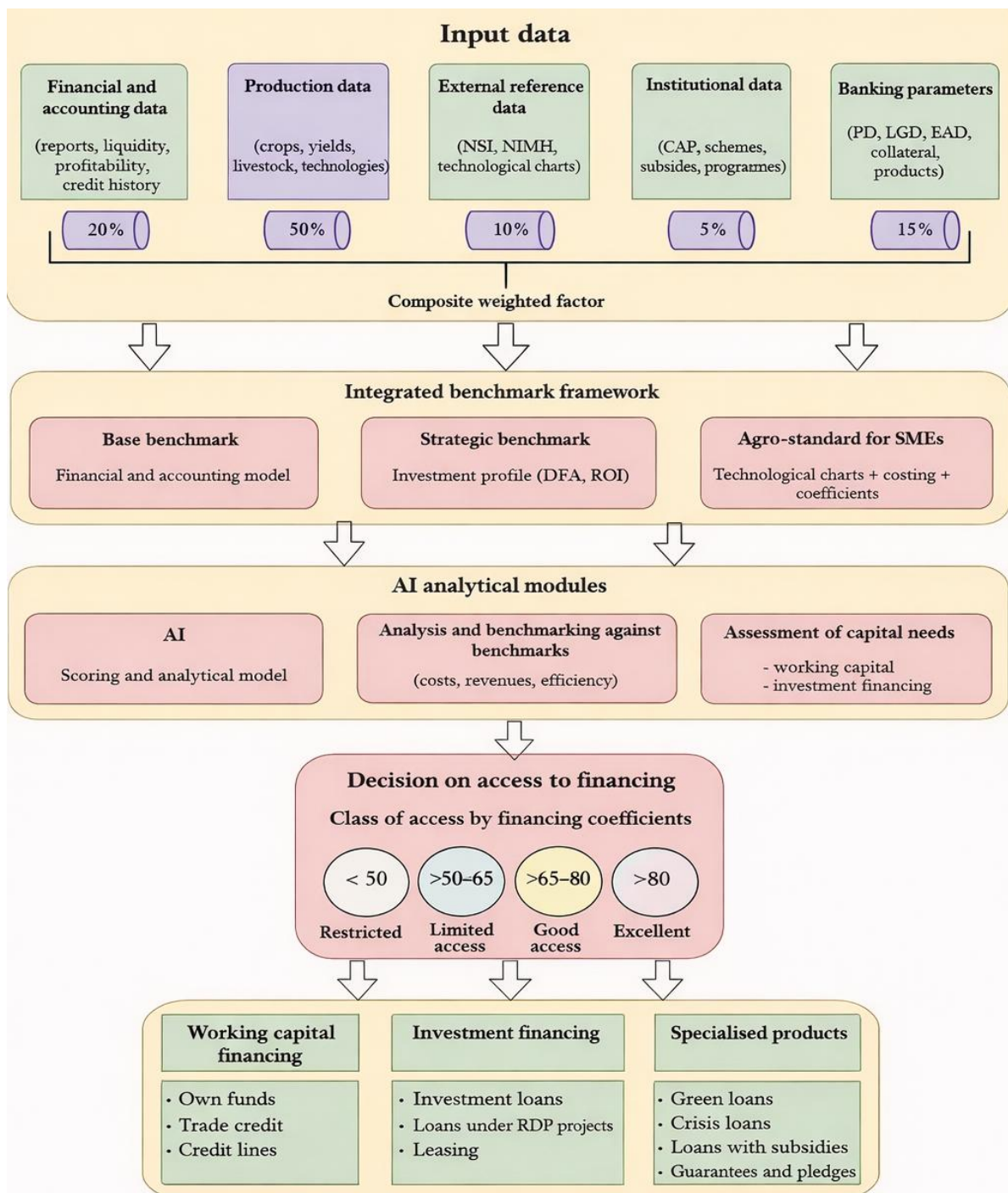


Figure 13. Integrated benchmark model using artificial intelligence for the assessment and structuring of financing for agribusiness enterprises

Source: Author's own elaboration

The main scientific contribution of this study lies in the development of an integrated benchmarking framework that extends beyond classical financial analysis. This is achieved by incorporating production, sectoral, and institutional factors, thereby

enabling a standardized assessment of working capital requirements, expected revenues and costs, and their linkage to risk under conditions of seasonality and limited financial reporting.

Subsection 3.3, “Communicating the Required Approaches with Stakeholders in Structuring the Financing of Agribusiness Processes,” examines the effectiveness of bank financing in the agricultural sector. This effectiveness depends not only on the availability of appropriate financial products and models, but also on whether all participants operate with a common “language,” comparable indicators, and synchronized procedures. A key practical challenge is information asymmetry, whereby farmers describe needs and risks in terms of the production cycle, while lenders translate these into financial parameters. The proposed solution is the development of a communication framework and a minimum set of standardized indicators across key stakeholders, including:

A) Banks and microfinance institutions, as leading providers of capital for working capital and investment processes, face a deficit of sector-specific data and standards in the agricultural sector. In this context, the transition from “generic corporate analysis” to an agriculture-adapted assessment implies: implementation of benchmark models; accelerated preliminary assessment using a minimal set of indicators; and an expanded advisory role of banks, extending from financing to supporting clients in managing financial planning.

B) Leasing companies and machinery suppliers often apply an asset-based logic at the expense of evaluating the sustainability of the business model. The application of benchmark-based assessment would help avoid financing agribusiness entities with existing overcapitalization and would enable the adaptation of financial products to seasonality, based on production and financial indicators.

C) Suppliers of fertilizers, plant protection products, and seeds, which frequently act as non-bank creditors through deferred payment or in-kind arrangements, could reduce risk by applying this model. This would allow them to avoid overfinancing inputs along the value chain and to prevent the accumulation of non-performing receivables.

D) National and European institutions (Ministry of Agriculture, State Fund Agriculture, European Commission), through their systemic role in establishing rules,

data infrastructures, programs, and guarantee schemes, have a critical contribution to the communication framework. The standardization of public data—such as prices, yields, technological sheets, and subsidy schemes—as inputs for benchmarking systems also supports innovative financial solutions that can leverage private capital and reduce risk for SMEs.

D) Consulting organizations (RDP/program- and project-based consultants) act as intermediaries between farmers, public administration, and banks. A standardized set of indicators improves the quality of business plans and reduces inconsistencies during application and approval processes.

E) Farmers are the final bearers of both risk and benefit. For them, the value of functional benchmark models lies in data accuracy and regularity. In return, they gain clearer requirements from financing institutions, opportunities for sectoral comparison and cluster-based positioning, and improved structuring of working capital and investment financing aligned with production cycles.

Subsection 3.2.2 addresses the need to establish reliable mechanisms for communication and standardization among all stakeholders. The effective application of benchmark analyses and integrated agribusiness financing models requires the development of:

1) A minimum set of indicators for preliminary assessment—covering production, financial, and managerial dimensions—applicable at the initial evaluation stage. This approach functions as a “common language” between lenders and agri-SMEs, reducing the time and cost of initial assessment and increasing process predictability for clients.

2) A national information environment for benchmark data, implemented through an electronic framework (platform or registry) that aggregates public and sector-specific data (prices, yields, cost indices, subsidies, technological sheets), with clear definitions and regular update cycles. The objective is to reduce discrepancies between “declared” and “reference” data and to accelerate the assessment process.

3) Standardized definitions, methodologies, and data rules, including cost categories for fuel, labor, fertilizers, plant protection products, land rents, specific measurement units, and acceptable deviations from established standards.

4) Institutionalized communication through permanent working formats, including standing working groups involving banks, the Ministry of Agriculture, the State Fund Agriculture, and sectoral organizations, aimed at updating benchmark indicators, synchronizing financial product solutions, and providing training and public guidance to farmers.

5) Digitalization and AI technologies enabling automated data validation, detection of deviations, and scenario-based cash flow forecasting, as well as personalized financing structures through tailored maturities, grace periods, and seasonal repayment schedules.

The expected benefits and sectoral impacts are multidimensional and can be summarized as follows:

A) Increased transparency and trust through the use of common indicators and shared data repositories, leading to reduced information asymmetry and fewer conflicting assessments between lenders and farmers.

B) Improved access to capital through standardized assessments that facilitate entry into financing processes, partially compensating for the lack of traditional financial data by relying on sectoral benchmarks.

C) Risk reduction and mitigation of erroneous decisions through early detection of deviations in costs, revenues, and balance sheet structures, resulting in less overfinancing and improved prevention of loan default.

D) Optimization of financial products along the production cycle, enabling more precise structuring of working capital and investment financing in line with seasonal repayment schedules, grace periods, and the integration of subsidies and guarantee instruments.

E) Promotion of sustainability and innovation through the inclusion of technological and ESG-related metrics, whereby financing supports modernization and improved managerial discipline, ultimately leading to more favorable financing conditions.

F) Stabilization of the entire agricultural value chain leads to more accurate assessment of capital needs and reduces tensions and payment defaults toward input suppliers and machinery providers, thereby enhancing the overall resilience of the chain.

G) Long-term competitiveness brings the sector closer to practices in which financing becomes a function of business model quality and risk management, rather than being based solely on collateral.

IV. STATEMENT OF THE DISSERTATION'S SCIENTIFIC CONTRIBUTIONS

1. The theoretical and methodological foundations of bank financing of business processes in the agricultural sector have been systematized and further developed, resulting in the formulation of a three-level analytical model - micro, meso, and macro, that accounts for the specific characteristics of agricultural production.
2. An analytical framework has been developed for assessing access to finance for agricultural enterprises, integrating financial, production, managerial, and institutional determinants, while explicitly accounting for seasonality, climatic risks, and market volatility.
3. An empirical study has been conducted among agricultural producers from the main subsectors of the agricultural sector, summarizing their attitudes and practices with regard to the use of bank financing.
4. The positive impact of farm size, managerial experience, and the quality of financial reporting on improved access to bank financing has been empirically demonstrated.
5. The role of direct payments under the Common Agricultural Policy has been evaluated as a stabilizing factor for liquidity and creditworthiness of agricultural holdings.
6. An original author-developed model has been proposed to enhance the effectiveness of bank financing of business processes in the agricultural sector, integrating credit risk analysis with the specific characteristics of agricultural production cycles.
7. Scientifically grounded practical guidelines have been formulated for improving the interaction between agribusiness enterprises and banking institutions.

V. LIST OF PUBLICATIONS RELATED TO THE DISSERTATION

Scientific Articles

1. **Vlaev, M. (2020).** The purchase of agricultural land – A well thought-out process in agribusiness enterprises. *Izvestia Journal of the Union of Scientists – Varna, Economic Sciences Series*, 9(3), 40–47. <https://doi.org/10.36997/IJUSV-ESS/2020.9.3.40>
2. **Vlaev, M. (2025).** *Attitudes of Agricultural Enterprises toward Bank Financing in Bulgaria.* **Business & Management Compass**, 69(4), pp. 60–75. <https://doi.org/10.56065/vkk13979>

Conference Papers

1. **Vlaev, M. (2018).** Financing of the agricultural sector – Aspects after Bulgaria’s accession to the EU. In *Challenges facing agribusiness and rural areas: Youth scientific conference with international participation* (pp. 82–90). Sofia, Bulgaria: UNWE Publishing Complex.
2. **Vlaev, M. (2018).** Lending to companies in the viticulture and wine sector in Bulgaria – Development opportunities and prospects. In *Sustainable development of the viticulture and wine sector – Challenges and growth opportunities* (pp. 222–233). Varna, Bulgaria: Science and Economics Publishing House.
3. Kirechev, D., & **Vlaev, M. (2019).** Dynamics of agricultural sector lending by commercial banks after Bulgaria’s accession to the European Union. In *Accounting, auditing and finance in a changing world* (pp. 212–228). Varna, Bulgaria: Science and Economics Publishing House.
4. **Vlaev, M. (2020).** Sustainable agricultural development during the crisis and financing opportunities. Varna, Bulgaria: Science and Economics Publishing House. <https://eclipse.ue-varna.bg/catalog/view/8Q9DFB82NW>
5. **Vlaev, M. (2021).** The purchase of agricultural land using a financial instrument – A key component of farm sustainability. In *Sustainable land resource management – Contemporary practices and solutions* (pp. 83–92). Varna, Bulgaria: Science and Economics Publishing House. <https://doi.org/10.36997/SLM2019.83>

6. **Vlaev, M., & Manova, D. (2021).** Diversification of activities through beef cattle farming – Opportunities, prospects and financing methods. Sofia, Bulgaria: UNWE Publishing Complex.

VI. DECLARATION OF ORIGINALITY

I hereby declare that this dissertation is an entirely original work authored by me and that no third-party publications or materials have been used in violation of their copyright.