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ABSTRACT

of a dissertation for the award of an educational and scientific degree "Doctor" (in Economics) in the doctoral programme "Finance, Money Circulation, Credit and Insurance" (Finance) on the topic:

PROBLEMS OF MANAGEMENT OF WORKING CAPITAL IN AGRICULTURAL ENTERPRISES

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Svishtov

2025

The dissertation has been discussed and referred for defence at a meeting of the Department Council of the Department of Finance and Credit at the Faculty of Finance of D. A. Tsenov Academy of Economics - Svishtov.

Information about the dissertation:

Number of pages – 193

Number of figures – 10

Number of tables – 20

Number of literary sources – 159

Number of publications by the doctoral candidate – 3

The defence will take place on 05.03.2026 at 11.00 in the Rectorate Meeting Hall of D. A. Tsenov Academy of Economics – Svishtov

The materials related to the defence are available at the Doctoral Studies and Academic Development Department.

CONTENTS OF THE AUTHOR'S ABSTRACT

I. General characteristics of the dissertation

1. Relevance of the Topic

In today's market economy, conducting competitive and effective business activities is crucial for the prosperity and financial stability of any company. The availability of sufficient capital, provided by shareholders or credit institutions, allows companies to enter the market where they can accomplish the results of their activities. These financial resources must be managed well and wisely, in accordance with the marketing approach selected by managers. This is a prerequisite for achieving optimal profits while minimising the risk of losses. Profits are then distributed both to the owners of the invested financial resources and to the working capital of the companies in order to maintain their operational activity. All this depends on the decisions made by the company's financial management, whose main task is to implement the chosen financial and economic policy. The proper organisation of this process maximises corporate wealth and is a testament to rationally set financial goals.

The above actions are inevitably linked to an adequate analysis of current economic activity. The analysis aims at examining methodically the financial situation of the company, its financial structure (sources of funds and how they are used) in order to achieve the appropriate profitability of its activities. These are goals that give persistent **relevance** to both the effective management of the company's capital as a whole and its working capital as the most dynamic capital component.

2. Object and Subject of the Dissertation

The object of the dissertation is *the management of working capital in enterprises*.

The subject of the study focuses on *the interrelationship and interdependence between the management of working capital in Bulgarian agricultural enterprises and their financial results*.

3. Research Thesis

The research thesis is formulated as follows: *on the one hand, rational management of working capital creates conditions for raised operational efficiency and generates prerequisites for improving the financial results of agricultural enterprises, and on the other hand, profit and profitability, in turn, are the basis for sustainable financing of their working capital.*

4. Aim and Objectives of the Dissertation

The aim of the dissertation is *to use appropriate analytical tools to provide a summary of the finances of enterprises in the agricultural sector in Bulgaria, examining trends in the dynamics of their working capital, liquidity, income, profit and profitability.* This allows for the identification of opportunities for making adequate operational financial and economic decisions and applying flexible mechanisms to improve the efficiency of working capital management in agricultural enterprises.

The set goal is achieved by solving the following **tasks**:

- To clarify the role and importance of working capital for the effective flow of the production process and for optimised financing, with a view to achieving sustainable positive financial results from the company's activities.
- To outline the conceptual nature of profit, its varieties, forms and structure, as well as its relationship with the company's working capital.

- To examine the basic techniques for analysing working capital, the concepts, key indicators of its size, liquidity, turnover and quantitative methods for analysing its dynamics.

- To perform an empirical analysis of trends in the dynamics of net working capital, net income and liquidity of agricultural holdings in the country and in individual regions, developing forecasts for its future development to support adequate operational decisions of a financial nature.

5. Methodology of the Research

The research methods used in the dissertation are: financial and accounting analysis, econometric modelling methods, the comparative method, inductive and deductive methods, the graphical method, statistical methods for characterizing patterns of development, regression analysis methods for identifying the relationships and dependencies between phenomena.

6. Structure of the Research

The dissertation is 193 standard pages long. It is structured in three chapters as follows:

INTRODUCTION

Chapter One. THEORETICAL AND APPLIED ASPECTS OF WORKING CAPITAL MANAGEMENT

1.1. Working capital management in the corporate management system

1.2. Profit and profitability – the basis for financing a company's working capital

Chapter Two. TOOLS FOR ANALYSING A COMPANY'S WORKING CAPITAL

2.1. Basic techniques for working capital analysis

2.2. Possibilities for econometric modelling of a company's working capital

      2.2.1. Analysis of dynamics

      2.2.2. Analysis of factor influences

Chapter Three. EMPIRICAL STUDY OF WORKING CAPITAL, PROFIT AND LIQUIDITY OF ENTERPRISES IN THE AGRICULTURAL SECTOR IN BULGARIA

3.1. Information and methodological support of the study

7. Approval of the Dissertation

The dissertation was discussed and approved for defence at a meeting of the Department of Finance and Credit at 1D. A. Tsenov Academy of Economics in Svishtov. Parts of the study have been presented at scientific forums and published in specialised academic journals.

II. Main Content of the Dissertation

Chapter One. THEORETICAL AND APPLIED ASPECTS OF WORKING CAPITAL MANAGEMENT

Paragraph 1.1. of Chapter 1 outlines *the place of working capital management in the corporate management system*. It is well known that assets are recorded in the balance sheet according to their degree of liquidity. Some of them can be converted into cash relatively quickly. Others are converted into cash much more slowly, which is why they are classified as long-term or fixed assets.

There are two principles for arranging assets: the principle of "increasing liquidity" and the principle of "decreasing liquidity". Regardless of which one is used, they show the same logic in drawing up the balance sheet. This greatly facilitates the financial analysis of the company and provides certain advantages in the management of investments and capital.

The maturity degree of a liability is the criterion that determines the order in which its individual elements are listed. It should be noted that share capital, reserves and retained earnings from previous years are owned by the company – they have zero maturity. All company's debts are external (borrowed) resources. Therefore, they have real maturity.

Assets' liquidity and liabilities' maturity determine the logic of the arrangement and the analysis of the use of capital. In each balance sheet, assets are presented in three large groups – real, financial and liquid. Liabilities are divided into equity and long-term and medium-term debts.

The synthesis of the balance sheet makes it possible to determine the technology for calculating net working capital. The financial synthesis is used to construct the company's financial balance sheet. The latter contains long-term and short-term assets on the one hand, and permanent capital and short-term liabilities on the other hand. The construction of the financial balance sheet facilitates the perception of "working capital". It is the basis for financing short-term investments. The management of short-term investments can hardly ensure a full return on the capital employed, which is a prerequisite for seeking other investment resources. This is because long-term assets cannot usually be financed with short-term debt.

The principle of minimum financial equilibrium requires that the capital intended for financing a specific element of long-term and short-term assets be made available to the company for a period corresponding to the duration of use of these assets. Long-term assets are usually financed with long-term resources. The short-term asset cycle ultimately restores the cash flow available for paying off short-term liabilities. If the value of current assets is equal to short-term liabilities, the latter can be paid off and the principle of minimum financial equilibrium is observed. At the same time, there may be items among current assets whose turnover is usually slower. This means that in contrast to some short-term liabilities they cannot be quickly converted into cash. Lower risk always leads to a slowdown in the normal turnover rate of current assets and delays the company's ability to meet its obligations within the specified time limits. A similar situation occurs when the value of current assets decreases: impairment of inventories, uncollectible loans, etc. The principle of minimum financial equilibrium is necessary, but the company must secure additional long-term capital in order to overcome the negative consequences of the delayed turnover of some of the current assets. Having additional long-term capital requires that current assets should exceed current liabilities. This capital is the company's financial buffer that protects it from the negative consequences of the delayed turnover of some current assets. They are an important tool for managing financial resources and are called "*net working capital*". The latter is additional capital equal to the excess of short-term investments over short-term liabilities. This resource is a kind of additional source of funds for the company. It consists of the part of long-term capital that is not used to finance long-term assets. Net working capital is calculated either as the difference between current assets and short-term capital, or as the difference between long-term capital and long-term assets (long-term investments).

The amount of additional long-term capital depends on the company's financial policy and its vision for its economic development. The uncertainty in securing it varies depending on the sector of the economy. The amount of working capital (at balance sheet level) is determined by the difference between consumption (investment) and the financing resources (capital) which arises during the production cycle. Hence, at an investment level, the decisive role is that of inventories, customer loans, other loans related to the production cycle, etc. At the same time, at a capital level, the important elements are advance payments and installments of customer debt, liabilities to suppliers, other debts related to the production cycle, etc.

For companies with substantial added value, the total requirements for financing that arise from the production cycle are higher than the total capital. The need for working capital in this case is positive and the money becomes available to the company. That need is met with long-term capital and varies depending on turnover, i.e. it grows when there is a growth in turnover. When turnover decreases, the need of working capital also decreases. The amount of cash that is free thus equals the difference between the old and new sum of working capital required .

Companies rarely have low added value. When they do, the total financing requirements arising from the production cycle may be lower than the total capital requirements. Consequently, the working capital requirement is negative. This is an opportunity to release long-term capital that can be used outside the production cycle. When turnover increases, available capital increases. If turnover decreases, capital also decreases. This requires the use of working capital outside production in an amount equal to the difference between the amount of old and new available capital.

Therefore, net working capital is reflected in the need for working capital, which is necessary for the financial structure of the company. It should be noted that net working capital should not exceed the need for working capital. In addition, net working capital must be increased by constantly using new capital if rational management does not lead to reducing the need for working capital.

Inventories turnover – a concept equivalent to their liquidity – is one of the main factors determining the amount of short-term financing. This is because inventories not only require financing, but also generate new capital. Thus, making the volume of short-term capital dependent on inventory needs is, in practice, a system through which the amount of the return of capital is higher than the capital itself. Increasing inventory turnover requires monitoring, control and maintenance of its volume and composition. In this respect, the main task of every manager is to form and maintain an optimal level of stocks. That optimal level implies maintaining a minimum stock level that supports the implementation of production programmes and at the same time ensures the timely return of invested capital. In principle, all other things being equal, a smaller volume of stocks determines higher liquidity, which logically leads to the use of less working capital.

Production requires prior organisation and formation of the stocks necessary to ensure its smooth running. Clearly, when it comes to stocks, one should not overlook the fact that, in principle, part of them are financed with long-term capital (net working

capital). Net working capital and the need for it depend to a large extent on the objective reasons for the delay in turnover – damage, theft, natural disasters, etc. This means that managing turnover (liquidity) is, in principle, also managing the need for long-term financing. In this case, any elimination of the impact of negative factors on turnover is a prerequisite for reducing the optimal level of net working capital and releasing long-term financing for other purposes.

Paragraph 1.2. of Chapter 1 focuses on *profit and profitability as the basis for financing working capital*. The effective management of working capital is directly related to the financial results of the company. The optimal ratio between current assets and current liabilities ensures not only liquidity but also lower financial costs. When asset turnover accelerates and capital is used more rationally, the efficiency of the production cycle increases, leading to higher profits and better return on invested capital. Thus, management of working capital becomes a key factor for achieving sustainable financial performance. The reverse relationship can also be identified – the profit and profitability levels directly affect management of working capital. Higher profitability provides greater internal financial resources that can be used to finance current assets and reduces dependence on external financing. At the same time, low profits limit the company's ability to maintain an optimal volume of inventories and liquid assets, which deteriorates its financial stability and can lead to difficulties in its current operations. This closes the circle of interdependence between working capital, profit and profitability (Fig. 1).
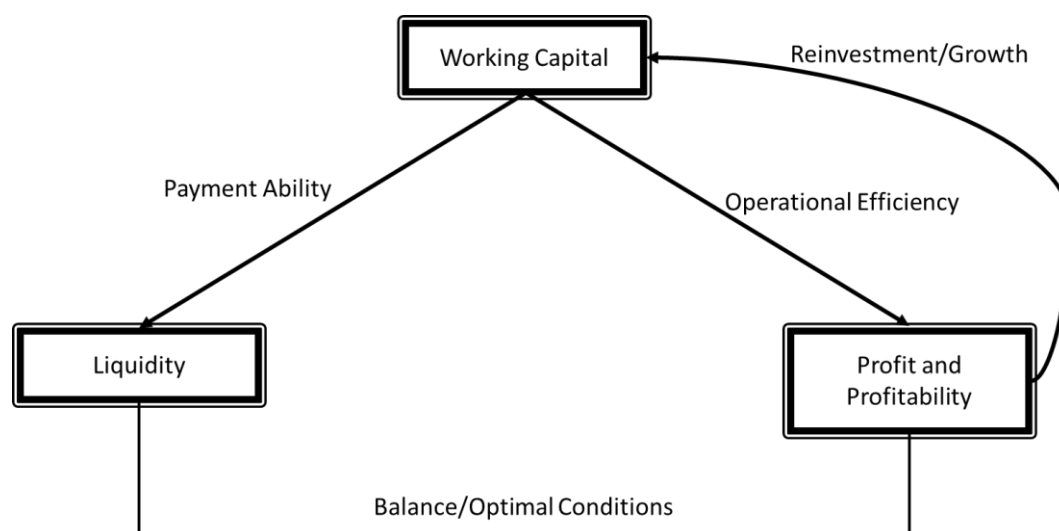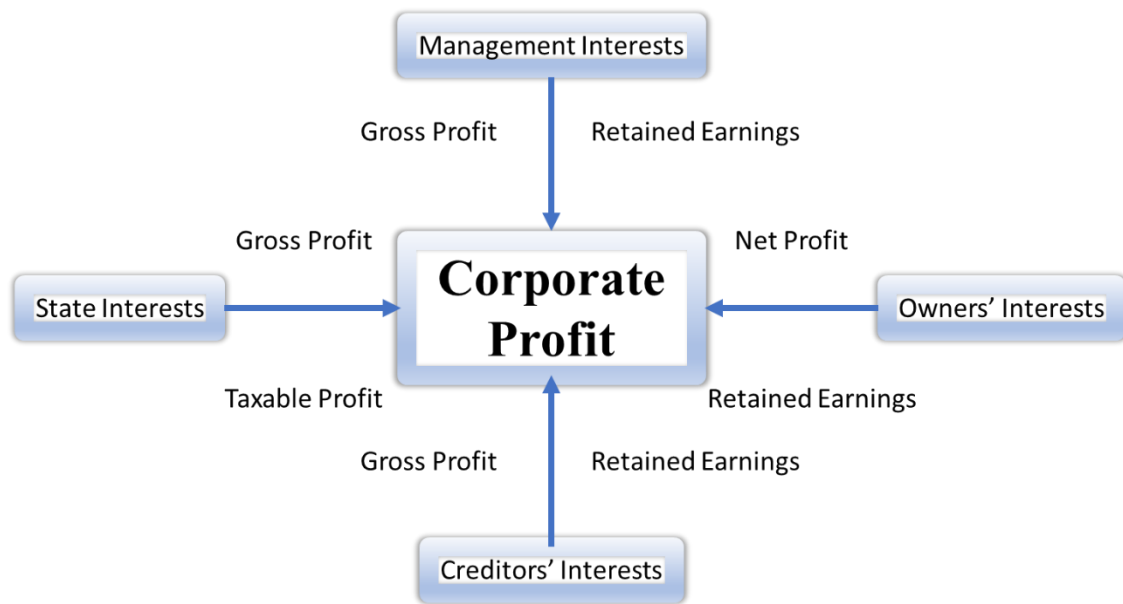

Source: Author's summary

Figure 1. Relationship and dependence between a company's working capital and its profit and profitability

The specifics of profit are considered from **an economic** and **accounting perspective**. From an economic perspective, it is the main source of increasing the wealth of owners . From an accounting perspective, several *types* of profit are used in practice. *Gross (operating) profit* is calculated as the difference between gross revenue and the total sum of accrued expenses. It is the primary, natural result of business activity. Various stakeholders have their interest focused on it: managers are primarily interested in the growth of gross profit, while the state approaches gross profit from the prism of profit taxes. The creditors of a company also pay attention to gross profit, as they use it to assess the potential of the business to repay loans and pay interest. Business partners are also interested in gross profit, as they use it to understand the reliability of the company and adjust the terms of contracts. *Taxable (fiscal) profit* is the difference between income and expenses before determining taxes on profit and adjustments under the Corporate Income Tax Act . It is stipulated that the amount of taxable profit will be obtained as the financial result, regardless of whether it is positive or negative, is adjusted by increasing or decreasing the income or expenses that are recognised (or not recognised, respectively) by the applicable tax legislation for the purposes of determining the tax on profit. Taxable profit is only of operational significance and serves as a basis for determining income tax. *Balance sheet profit* represents the final financial result of the overall activity. Its amount is stated in the income statement and the balance sheet. It is calculated as the difference between taxable profit and income tax payable and deductions in accordance with regulatory documents. This profit is subject to distribution within the company. *Retained earnings* are formed after deducting dividends and profits taken by the owners from the net profit. This profit contributes to the real increase in the company's own capital and is intended for investments, current business and other purposes.

Profit in business, approached from the perspective of four types of profit, is a nexus of interests and is analysed and evaluated through these interests. The structure and interactions of interests in profit are presented in Fig. 2.

Source: Author's summary

**Figure 2. Structure and interactions of interests
towards company profit**

The interests in company profit presented above are the basis for two important conclusions for practice: first, the synchronisation of interests in profit is based on gross profit (incoming) and retained earnings (outgoing) ; second, interests in different types of profit are subject to regulation and management. If this is underestimated, asynchronous influences on interests arise, which ultimately disrupts corporate strategy and tactics .

Within a company, profit exists in three main *forms* : current year profit, accumulated profit and retained earnings from previous years. The forms of profit distribution are specified in the articles of association or specified in regulatory acts. A large part of the profit is used to expand the business, improve working conditions for staff and increase equity capital. Another part is used to repay loans for investments and meeting working capital needs, and a third part, through distribution and redistribution, is accumulated in municipal budgets and the state budget.

Profitability is an important criterion for determining the economic efficiency of a company's business activities. It is a summary economic indicator of the results of activities in relative terms. It determines the ability of capital to generate profit and measures the degree of profitability . The higher the percentage of profitability, the

greater the ability of a company's for self-financing and obtaining loans from commercial banks on favourable terms. The normal functioning and prosperity of an enterprise implies a level of profitability which, after paying taxes, covers all its expenses, including those for expanding its activities. Therefore, profitability determines the position of an economic activity in a competitive environment and gives awareness about the degree to which that activity is future-oriented.

Financial indicators are the basis for forecasting the future development of an enterprise. According to accounting standards, financial indicators express the quantitative characteristics of a separate element of the financial situation or the financial results obtained through the financial and accounting analysis. The main indicators of a company's performance are the gross profit ratio and the net profit ratio, which give some idea about the effective use of material and labour resources. ***Two groups of indicators*** are used to detail the analysis***:***

1. indicators characterising the ratios between income and the various items on the balance sheet, which give an idea about a company's ability to generate income with the resources available;

2. indicators characterising the ratios between a company's income and its ability to cover its expenses.

The first group includes the following indicators:

- *Return on assets ratio*, also known as "net return on sales" or "profitability ratio". It consists of two components, the first characterising marketing efficiency and the second characterising the relationship between sales and total assets (known as "asset turnover").

- *Return on financial operations ratio*, which expresses the specificity of a company's income and the various effects of asset utilisation.

- *Profitability ratio of extraordinary operations*, which gives an idea about the turnover of assets and the profitability of extraordinary operations.

- *Return on equity ratio*, which allows profitability to be analysed from the owners' perspective, depending on total capital resources and financial efficiency. It can be fragmented into three components which characterise: the effectiveness of marketing activities, the effectiveness of production, and the ratio between a company's total assets and equity, i.e. the real economic benefit obtained per unit of capital invested – the overall financial efficiency of the company.

- *Return on equity ratio excluding preferred stock capital*, taking into account the presence of part of the equity in joint-stock companies, which may be acquired through the issue of preferred shares. This implies a mandatory dividend payment, i.e. it leads to a reduction in the profit that remains for reinvestment or distribution among ordinary owners.

The second group of indicators includes:

- *Gross profitability of operations*, which characterises the level of profitability of sales as a whole and of individual products. The indicator is suitable for analysing the company's product list when calculated for individual products or product groups in order to determine the stage of the life cycle in which they are. In this way, competitive products are distinguished from declining products, and new products are introduced on the market to replace those that are declining.

- *Gross sales profitability*, which is calculated on the basis of the gross result from the sale of products, excluding financial and extraordinary income and expenses.

- *Net return on sales*, which shows the net profit (loss) from 100 levs of sales (one product). By comparing it with the first two indicators, the impact of the tax burden is taken into account.

- *Necessary profit growth*, which takes into account the impact of inflation on economic activity. In a situation of intense inflation, profitability will reflect not only the result of the activity, but also inflationary processes.

In a market economy, the interests of a business enterprise are primarily focused on profit and profitability, which are directly determined by its behaviour in the dynamic market environment. Their analysis is linked to the continuous study of the impact of *the factors* that define profit and profitability. These include: business expenses; sales of goods, services, finished products; stocks of finished products, goods and work in progress; receivables from customers. All factors are interrelated and interact with one other. It is indisputable that strategic factors for profit are the costs incurred for materials, labour, depreciation, and external services. They are called operational because managers use them to run the business and generate profit. The interaction between the main and the additional factors are taken into account. The main factors are operating income, inventories of finished products,

goods, and receivables from sales. Additional factors include financial income and expenses, as well as extraordinary income and expenses.

Attention is paid to the purpose and objectives of profitability analysis and the relationship with capital owners. Gross profit analysis is based on *the ratio between revenue and expenses*, which gives an idea of the behaviour of the direct factors that operate at the various stages of profit formation. The first level of sales profit analysis involves comparing revenue from sales with production and sales costs. Based on the functional profit model, the absolute difference method can be used to analyse the impact of costs and revenues. The second level of sales profit analysis involves quantifying the impact of individual factors in terms of costs and revenues. The increase or decrease in profit from product sales depends on changes in costs and revenues. Behind these generalised factors lie six separate elements, whose combined impact determines the deviation of actual profit from sales from planned profit from sales.

The analysis of profit from sales can be deepened along the functional relationship "Costs-Volume-Profit". When examining the relationship between costs, revenues and financial results at the stages of the product life cycle, it is established that the financial result is zero at the critical point. This model makes it possible to identify the desired production volume that guarantees a certain profit, at constant or fluctuating levels of the main parameters of the goods. Through a dynamic analysis of the "Cost-Volume-Profit" relationship, it is possible to maintain the profitability of products within a certain range. One of the avenues for improving the analysis of operating profit is to study the relationship between the rate of capital turnover and the operating profit per turnover. The analysis of the impact of turnover on the dynamics of operating profit provides information for the control of resource management for increasing the profitability of an economic activity.

The analysis of profitability based on assets makes it possible to assess the impact of changes in the amount and structure of revenues, expenses and assets on its dynamics. In addition, the analysis allows assessing the impact of the volume and structure of sales, the marginal income per unit of sales, fixed costs, financial income, extraordinary expenses, tax expenses, tangible and intangible fixed assets, long-term investments, long-term receivables and current assets. Thirdly, the impact of the following factors can be measured: profit per lev of revenue, turnover ratio of tangible fixed assets, turnover ratio of intangible fixed assets, turnover ratio of current tangible

assets. When analysing profitability on an asset basis, the impact of changes in the method of asset depreciation and changes in the methods of inventory valuation must also be taken into account.

The analysis of profitability based on costs at the first level of detail makes it possible to assess the impact of the mechanism of forming the financial result and the major types of costs on profitability. The analysis at the second level allows for a more precise assessment of the volume and structure of sales, as well as the nature of the different types of costs in terms of sales volume.

The analysis of profitability based on revenue, at the first level of detail, makes it possible to assess the impact of the mechanism of forming the financial result and the main types of revenue on profitability. At the second level, it allows for more precise estimates in terms of volume, structure and marginal income from sales. At the third level, the analysis allows for a comparison between different options for reaching a certain level of profitability.

The analysis of the relationship between asset turnover, capital and profitability is conducted using the method of deterministic factor modelling. This makes it possible to analyse and manage the level of capital turnover in general and by type, as well as the individual profitability of revenue in terms of total capital return. The analysis can be conducted through chain substitution. The well-known DuPont model is based on similar principles. The main advantage of this model is that it focuses directly on the key factors affecting the return on corporate capital.

The analysis of capital-based profitability in relation to turnover aims, first, at assessing the impact of factors related to the mechanism of financial result formation and the overall capital structure of the enterprise. Second, it allows for more precise assessments of changes in capital structure. Thirdly, it enables analysts to study further the relationship between capital utilisation and the volume and structure of production, revenues and expenses of the enterprise. Fourthly, it provides clarity on the impact which changes in capital have on profitability. In addition, it is possible to assess the profitability of production, the profitability of assets and the capital structure on the overall profitability of an enterprise's capital.

Chapter Two. TOOLS FOR ANALYSING A COMPANY'S WORKING CAPITAL

Paragraph 2.1. of Chapter Two discusses some *basic techniques for analysing* a company's *working capital*. Working capital is considered in two main states. Gross *working capital* refers to a company's total current assets, i.e. all assets that can be converted into cash within one year (receivables, inventory of raw materials, WIP inventory, finished goods inventory, cash and bank balances, marketable securities such as government securities, commercial paper and other short-term investments). Net working capital is the part of current assets that is financed through equity or long-term debt.

The balance sheet shows the accounting status of the company, which is subject to the equality between investments and capital. This is an economic equation, rather than a straightforward numerical one. Accounting equality becomes financial if it corresponds to the optimal production structure of the company to which it applies. The equality between assets and liabilities is a prerequisite for examining a company's solvency by using special ratios mainly related to the net working capital. The arrangement of investments in assets is a prerequisite for examining a company's ability to meet its short-term debts.

Liquidity is not a static phenomenon. It is an intrinsically dynamic variable. Under certain conditions, a lack of liquidity may mean that the company cannot take advantage of favourable business opportunities when they arise. In this phase, a lack of liquidity implies a lack of freedom of choice. In practice, financial management has its "hands tied" and no room for manoeuvres. Approached from a classical perspective, a liquidity shortage means that the company is unable to pay its current liabilities. This can lead to the forced sale of long-term assets and, in its most extreme form, to bankruptcy. Liquidity problems also affect negatively the owners of the company, suppliers of working capital, customers, etc.

Hence, a question that arises logically is that about *the factors* affecting liquidity, on the one hand, and on the other hand, about *the measures* which can be used to study and evaluate it. The basic principle is that liquidity should be linked to and represented by the state of a company's working capital. In fact, its level is a direct consequence of the state of the net working capital which, by its nature, represents a measure of liquidity. In addition to it, of course, there are other important measures of liquidity, which are the subject of the analysis that follows.

The indicators used to determine liquidity are:

● *The total liquidity ratio* which indicates the ability of an enterprise to cover its current operations liabilities through the availability of current assets. It is calculated as the ratio between current assets and current liabilities.

● *The quick liquidity ratio* which expresses the ability of an enterprise to pay its short-term (current) liabilities with available medium-term assets. This indicator should be considered together with the indicator of the period for collecting receivables. It is calculated as the ratio of short-term receivables, financial assets and cash to short-term liabilities.

● *The immediate liquidity ratio* which shows the ability of a company to pay its short-term (current) liabilities with available highly liquid assets. The value of current liabilities also includes the amount paid during the year to repay long-term liabilities.

● *The absolute liquidity ratio* reveals the ability of an enterprise to pay its short-term (current) liabilities with available cash, with the value of current liabilities including the amount paid during the year to repay long-term liabilities.

Working capital management is a complex process. Funds invested in inventories and receivables do not generate direct income. The smaller their amount, the less capital is "frozen" in them. Working capital management is based on an analysis of its turnover indicators. These are:

- *The duration of one turnover in days* which provides information about the time required to complete one turnover of material inventories. The shorter the turnover period, the less capital is required to achieve the corresponding financial result. It is calculated as the ratio between the average availability of material stocks and the net amount of sales revenue, where the average availability is equal to the sum of the initial and final balances of material stocks, divided by two and multiplied by 360.

- *The number of turnovers* that shows how many times the material stocks have been converted into a product of labour. The higher the value of this indicator, the more revenue will be generated using the same resources. It is calculated as the ratio between net sales revenue and average material stock availability.

- *The utilisation of material inventory* which provides information on material costs per unit of sales revenue. It is calculated as the ratio of the average availability of material inventories to net sales revenue.

- *The period for collecting receivables from customers* shows the time a company will need to collect its receivables from customers. It is calculated as the ratio between

the average availability of receivables from customers and the net amount of sales revenue. The average availability is equal to the sum of the opening and closing balances of receivables, divided by two and multiplied by 360.

- *The period for settling liabilities to suppliers* – provides information about the time during which the company is credited by its suppliers. It is calculated as the ratio between the average availability of liabilities to suppliers and the amount of deliveries, and the average availability is equal to the sum of the opening and closing balances of liabilities, divided by two and multiplied by 360.

Paragraph 2.2. presents *the main econometric techniques for analysing the working capital, profit and liquidity of agricultural enterprises* . Two main aspects of econometric modelling are outlined: 1) the analysis of dynamics which reveals trends in their development and makes it possible to make scientifically based forecasts, and 2) the analysis of the links and dependencies between working capital and a number of determining factors, in order to identify measures for effectively controlling the dynamics of the financial position and financial performance indicators.

In order to establish the manner in which the working capital of enterprises develops, it is necessary to **analyse the dynamics of that capital**. For this purpose, descriptive indicators of development are used, namely:

- *Absolute growth* – indicates the absolute change in working capital, profit and liquidity indicators.

- *Growth rate* – expresses the relative change in indicators. It shows how much the value of a financial indicator is higher or lower compared to the value taken as a basis.

- *Growth rate* – characterises the relative change in working capital, profitability and liquidity. It can also be interpreted as relative growth. It is calculated by subtracting 1 (or 100%) from the respective growth rates.

- *Average absolute growth* – reflects the average absolute change or difference in analysed indicators per unit of time during the researched period.

- *Average rate of development* – this is a summary measure of the average rate of development of financial indicators over a specified period. It is interpreted as the rate of growth which a financial indicator would have in each of the time intervals if it were subject to the effects of permanent factors only.

- *The catch-up ratio* which compares the rates of development of two phenomena.

There are two major approaches to modelling the dynamics of working capital, profit and liquidity.

The first method employs *trend functions of time.* When constructing them, the trend of development is approached as a function of time. On the one hand, the nature of the phenomenon under study is taken into account. On the other hand, formal criteria based on the descriptive characteristics of the series are used. The estimates of the parameters of the trend models are calculated by using the method of least squares. Short-term development of working capital can be predicted with the mechanical extrapolation of two summary descriptive indicators: average growth and average rate of development. It is possible to make forecasts based on trend models when objective patterns in the development of a phenomenon have been identified as trends that will continue to operate in the same way in the future. Such forecasts have significant advantages over forecasts based on average rates and average growth rates, since they make it possible to calculate stochastic errors and to construct confidence intervals. In addition to showing the probable value of the dynamic series in the future, they also indicate the limits within which that value may range with a probability predetermined by the researcher.

The second method for modelling and forecasting is based on an important class of models that describe *the internal patterns in the development of dynamic series.* Many series are stationary – they fluctuate around their equilibrium value, expressed as the mean value of the series or the mean level. They may be higher or lower than it, but deviations from the equilibrium value are not substantial and do not continue for a prolonged period of time. Since the relationship between the current value of the dynamic series and their previous values is linear, the models are called linear stationary models. They are: autoregressive models and moving average models.

Autoregressive models express in a straightforward manner the dependence of the current state of a phenomenon on previous ones. Their application requires establishing the order of the process, which is done on the basis of partial autocorrelation coefficients. The estimates of the parameters of autoregressive models can be determined in three ways: by using the method of least squares, the Uhl-Walker method, and the method of maximum likelihood. Autoregressive parameters are interpreted as follows: they measure the dependence of the current state on a past state, provided that the influence of all other previous states has been eliminated.

Moving average models compare the current value of the dynamic series with the current value and preceding values of random deviations. The order of the moving average models is determined based on the autocorrelation coefficients of the series. The model is solved and the estimates of its parameters are made with the maximum likelihood method. Using the Kalman filter is also convenient once the model has been converted into the so-called "state-space" form.

The analysis of the impact of various factors on changes in working capital, profit and liquidity is conducted by using regression analysis and constructing econometric models. *An econometric model* is an economic model that presents estimates of existing relationships and objective dependencies between economic phenomena. In general, an econometric model is an abstraction expressed through formal mathematical means, whose logical structure is determined by the objective properties of the described object and the purpose of the study. Econometric modelling goes through the following stages: 1) formulating the problem, defining the study purpose and objectives and the variables in the model; 2) conducting a qualitative analysis to identify the nature of the phenomena and the economic content of the indicators, and to formulate the primary hypotheses and assumptions; 3) constructing a model to establish the specific functional form of the relationship between variables and parameters and distinguish between endogenous, exogenous and lag variables. the initial assumptions and constraints of the model are established; 4) gathering data about the values of the indicators used in the model; 5) solving the model by using statistical methods to evaluate the parameters of the model and calculate their specific numerical values; 6) diagnosing the model by checking the extent to which the basic requirements set during the construction of the model have been met; statistical tests for normality, adequacy, independence, identity, etc. are used; 7) interpreting the obtained estimates and summary characteristics; forecasts for future development are made and conclusions and recommendations for timely and adequate managerial decisions are formulated.

Chapter Three. EMPIRICAL STUDY OF WORKING CAPITAL, PROFIT, AND LIQUIDITY OF ENTERPRISES IN THE AGRICULTURAL SECTOR IN BULGARIA

Paragraph 3.1. justifies the use of indicators of net income, net working capital and liquidity ratio of enterprises in the agricultural sector in Bulgaria, as well as specific

statistical tools for establishing the development trend and its modelling. The information for the analysis is based on official data from the Agricultural Accounting Information System, which aims at collecting and summarising information about the income of agricultural holdings on an annual basis. This activity is conducted by the Agrostatistics Department of the Ministry of Agriculture and Food. The requirements for comparability of analysed data and the official information base that is available are the grounds for limiting the empirical study to the period from 2010 to 2020.

Paragraph 3.2. of Chapter 3 presents the results of *the statistical analysis of the dynamics of the net income of agricultural holdings in Bulgaria*. The average net income of agricultural holdings in the country for the period under review varies widely, from BGN 13,387 in 2016 to BGN 38,279 in 2018. During the period, the increase in absolute terms was BGN 17,988, or 102.33% in relative terms. The increase in the indicator was not constant throughout the entire period. Until 2016, the dynamics fluctuated, with the main trend being downward – from BGN 16,340 to BGN 13,387, i.e. a decrease of BGN 2,953 or 18%. In the following years, the trend was not clearly defined, either –increases and decreases alternated, but the levels of the indicator were significantly higher than in the previous sub-period. Overall, for the entire period under review, there was an average annual increase of BGN 1,798.8 in absolute terms and 7.71% in relative terms (Fig. 3).
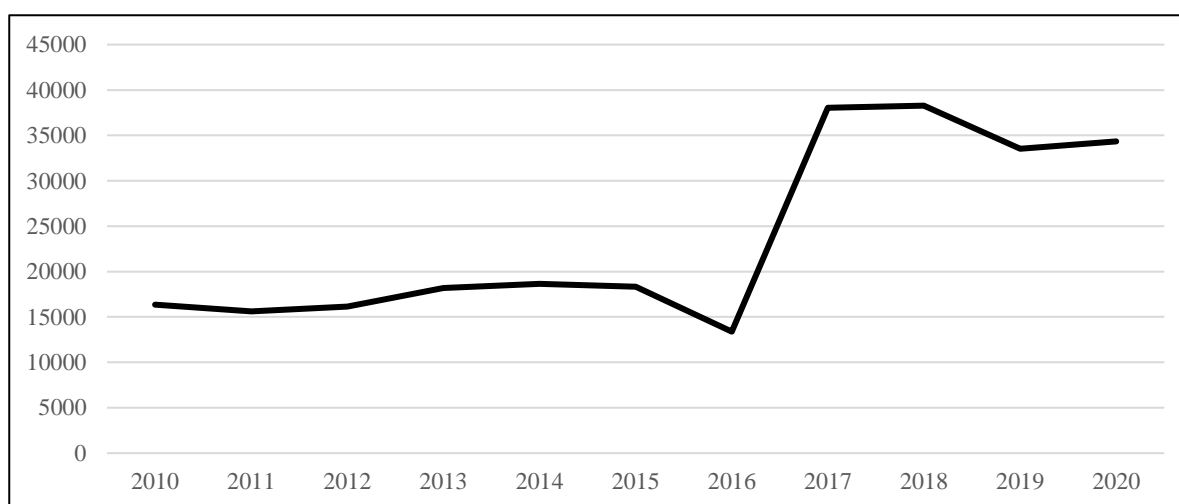
Source: author's calculations based on data from the Ministry of Agriculture and Food
        (www.mzh.govermment.bg)

Figure 3. Dynamics of the net income of agricultural holdings

in Bulgaria for the period 2010-2020

From a regional perspective, there were differences in the dynamics of net income, both in terms of the levels of the indicator and its dynamics. At the beginning of the period under review, net income was lowest in the South-West region – BGN 3,499, and highest in the North-East region – BGN 27,321, i.e. there was a nearly eight-fold difference. In 2020, that difference decreased but remained significant – the value of the indicator for the North-East region (BGN 20,534) was three times as low as its value for the North-West region (BGN 61,464). In the period 2010-2020, an increase in net income was observed in all regions, with the exception of the North-East region, where a decrease of BGN 6,787 in absolute terms and 24.8% in relative terms was recorded. The growth in the value of the indicator for the South-western region was impressive, reaching nearly 900% in relative terms for the entire period under review. The dynamics of the indicator at a regional level show a change in direction or intensity of change after 2016, when agricultural holdings reported some of the lowest net incomes. After that year, there was a general upward trend, followed by a clear decline in some regions (the North Central, the North-East and the South-East one). For the period 2010-2020, the largest average annual increase in absolute terms was recorded in the North-West region (4013.6 BGN), and in relative terms in the South-West region (25.86%) (Fig. 4).
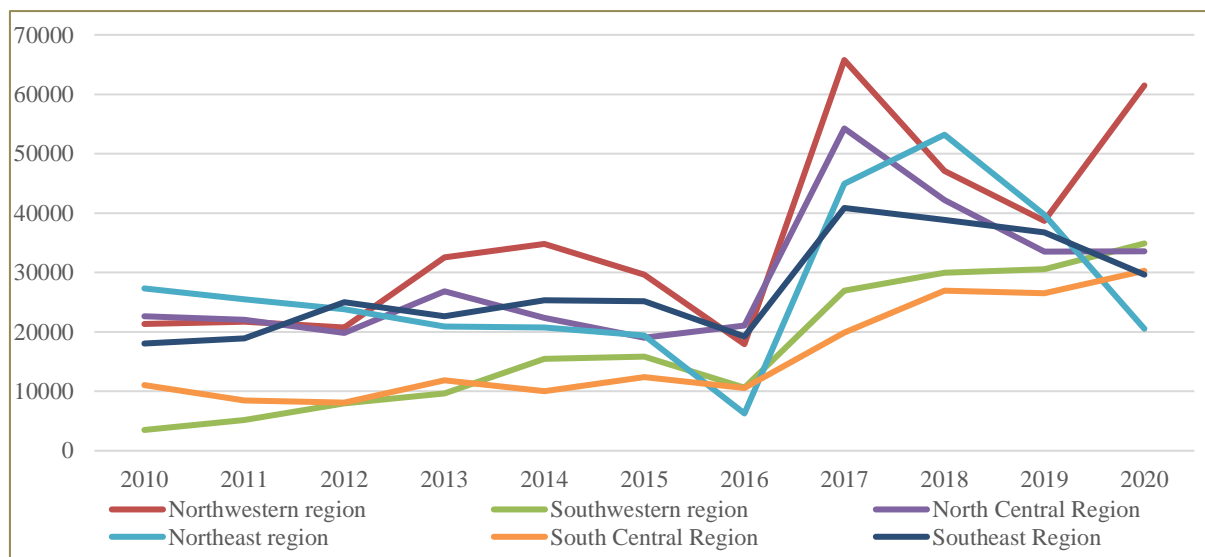
Source: author's calculations based on data from the Ministry of Agriculture and Food (www.mzh.govermment.bg)

Figure 4. Dynamics of the net income of agricultural holdings
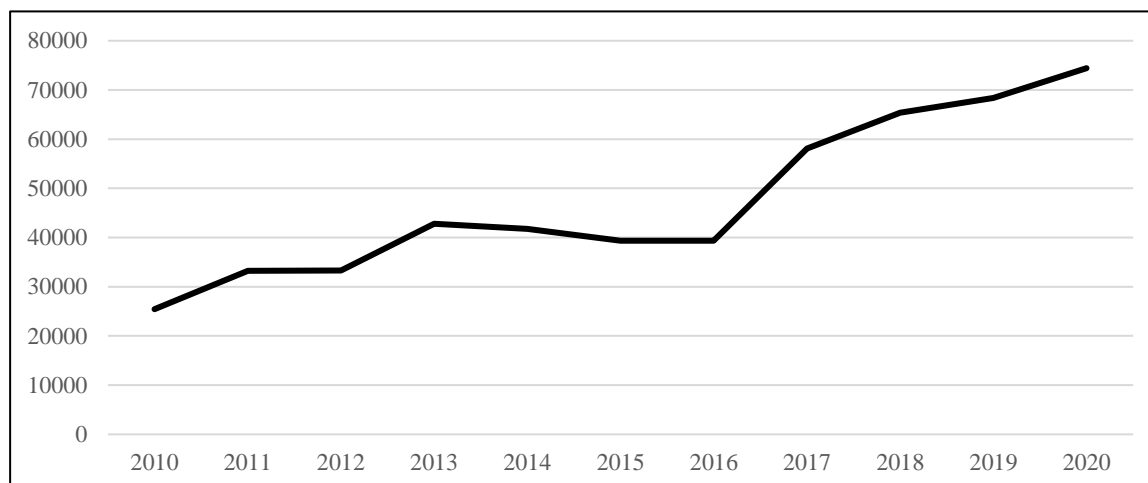
at a regional level for the period 2010-2020

Based on the trend models of the linear spline function, short-term forecasts of net income for the period 2021-2026 have been developed. For this purpose, point estimates were calculated by extrapolation, the confidence probability being 95%, i.e. there is a 5% risk of error for the forecasts made.

The results of the forecast analysis show that over the next three years, the net income of agricultural holdings in the country is expected to decline, reaching BGN 28,911.3 in 2023 and falling to BGN 24,154.5 in 2026. Confidence intervals show that in 2023, the expected net income will range from BGN 18,250.73 to BGN 39,571.87, and in 2026, it will range from BGN 7,782.66 to BGN 40,526.34. A decrease in net income to BGN 16,666.67 is also expected in farms in the South-East region in 2023, the decline being expected to continue further and reach a level of BGN 2,851.67, which is the lowest level since the beginning of the study period. Upon examining the confidence intervals of the forecast value for the years after 2023, we establish negative values. In our opinion, this is unlikely and the reliability of the forecast should be approached with some scepticism. We believe that it is more likely that there will be a change in the intensity or even in the direction of changes in net income. The forecast for the change in the indicator under review in the other two regions is optimistic, i.e. towards growth. In the South Central region, the increase is expected to reach BGN 39,785 in 2023 with confidence intervals of BGN 30,010.02 and BGN 49,559.98 and BGN 49,038.50 in 2026, with a forecast range from BGN 34,026.69 to BGN 64,050.31. The amount of net income in the South-West region will also continue to grow and is expected to reach BGN 41,606.90 in 2023, with the limits of the forecast values at 95% probability ranging from BGN 27,651.16 to BGN 55,562.64. For 2026, the point forecast is BGN 48,959.00, with confidence limits of BGN 27,526.64 and BGN 70,391.36.

Paragraph 3.3 analyses *the dynamics of the net working capital of agricultural holdings in the country*. In the period from 2010 to 2020, it rose from BGN 25,438 in 2010 to BGN 74,424 in 2020, i.e. by BGN 48,986 in absolute terms and by more than 192% in relative terms. Three distinct sub-periods of change can be clearly identified: an increase until 2013, a decrease after 2013 until 2016, and another increase after 2016. During the first sub-period, net working capital increased to BGN 42,796 (by BGN 17,358 compared to the beginning of the study period) at an average annual growth rate of 18.9%. In the subsequent sub-period, working capital decreased to BGN

39,345, i.e. by BGN 3,451. This was followed by a period of significant growth at an average annual rate of 17.3%, reaching the maximum value for the period under review (Fig. 5).
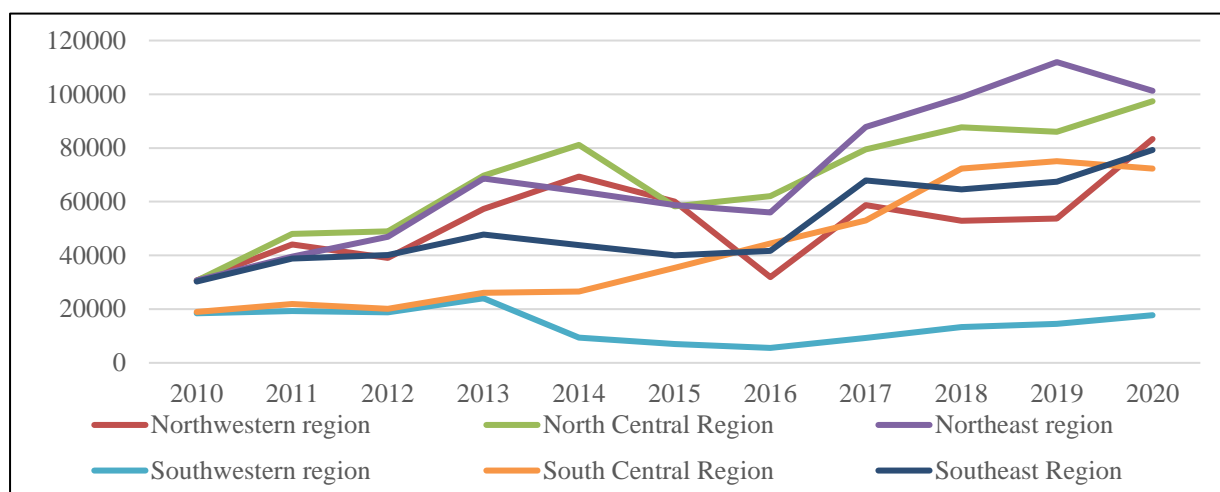

Source: author's calculations based on data from the Ministry of Agriculture and Food
(www.mzh.govermment.bg)

Figure 5. Dynamics of the the net working capital in agricultural holdings in Bulgaria for the period 2010-2020.

At a regional level (Fig. 6), there are significant differences in both the direction and intensity of changes in net working capital. Overall, for the entire period under review, all regions reported an increase in the values of the indicator, with the exception of the South-West region, where the working capital of farms decreased by BGN 723 in absolute terms or by nearly 4% in relative terms. The intensity of changes in the different regions varied, but in all of them the direction of change was not constant and there sub-periods of increase alternated with sub-periods of decrease. In 2010, the lowest value of the indicator was for farms in the South-West region (BGN 18,517), and the highest was for farms in the North-East region (BGN 30,695), i.e. a difference of BGN 12,178. At the end of the study period, the regional distribution remained unchanged, the highest net working capital (BGN 101,314) being reported by farms in the North-East region, and the lowest (BGN 17,794) by farms in the South-West region.

In absolute terms, the largest increase in the value of the indicator was in the North-East region (by BGN 70,619), and in relative terms in the South-Central region (by 281.5%). In terms of the average annual change in the net working capital, we should note that in absolute terms it was most noticeable in the North-East region (by

BGN 7,061.9 on average), while the relative change, based on the growth rate, was highest in the South Central region, at 14.3% on average for the period under review.
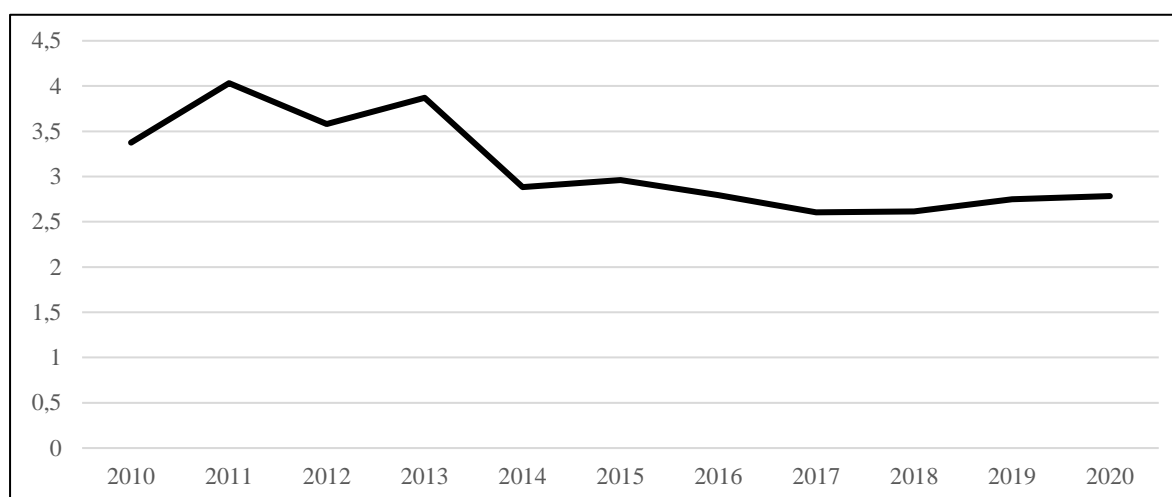

Source: author's calculations based on data from the Ministry of Agriculture and Food
(www.mzh.govermment.bg)

Figure 6. Dynamics of the net working capital in agricultural holdings at a regional level for the period 2010-2020.

Based on the trend models of the linear spline function, short-term forecasts of the amount of net working capital for the period 2021-2026 were made. The point estimates were calculated through extrapolation at a confidence level of 95%, i.e. the forecasts were made with a 5% risk of error. Short-term forecasts about the net working capital indicated that in the following years, the value of the indicator for agricultural holdings in the country will continue to grow to reach BGN 89,986.50 in 2023 and BGN 105,600.00 in 2026. With a 95% confidence level, the value for 2023 is predicted to be between BGN 70,395.49 and BGN 109,577.51. For 2026, it is expected to be between BGN 75,513.35 and BGN 135,686.65.

At a regional level, predicted values indicate that an increase in net working capital is expected in farms in each of the regions under review, the forecast for the South Central region appearing to be more specific, since the value of the indicator is expected to grow at an extremely low rate. Therefore, the level of the working capital in farms in that region could be expected to remain relatively constant within the forecast period.

Paragraph 3.4. of Chapter Three presents the results of the analysis of *the dynamics of the liquidity ratios of agricultural holdings in the country.* During the period under review, the liquidity ratio in farms followed a downward trend, from 3.38 in 2010 to 2.78 in 2020, which in absolute terms was a decrease of 0.59 percentage points, and in relative terms – 17.51%. For the period from 2000 to 2020, the average rate of change in the liquidity ratio was 98.09%, indicating an average annual decrease in liquidity of 1.91%. The decline rate of the value of the indicator was highest in 2014 compared to 2013, when a decrease of 25.58% was recorded. The dynamics of liquidity can be divided into two sub-periods – from 2010 to 2014 and after 2014. In the first sub-period, there was a more noticeable trend in the values and direction of liquidity change, while in the second sub-period, the ratio changed within much narrower limits – from 2.96 in 2015 to 2.78 in 2020. (Fig. 7)
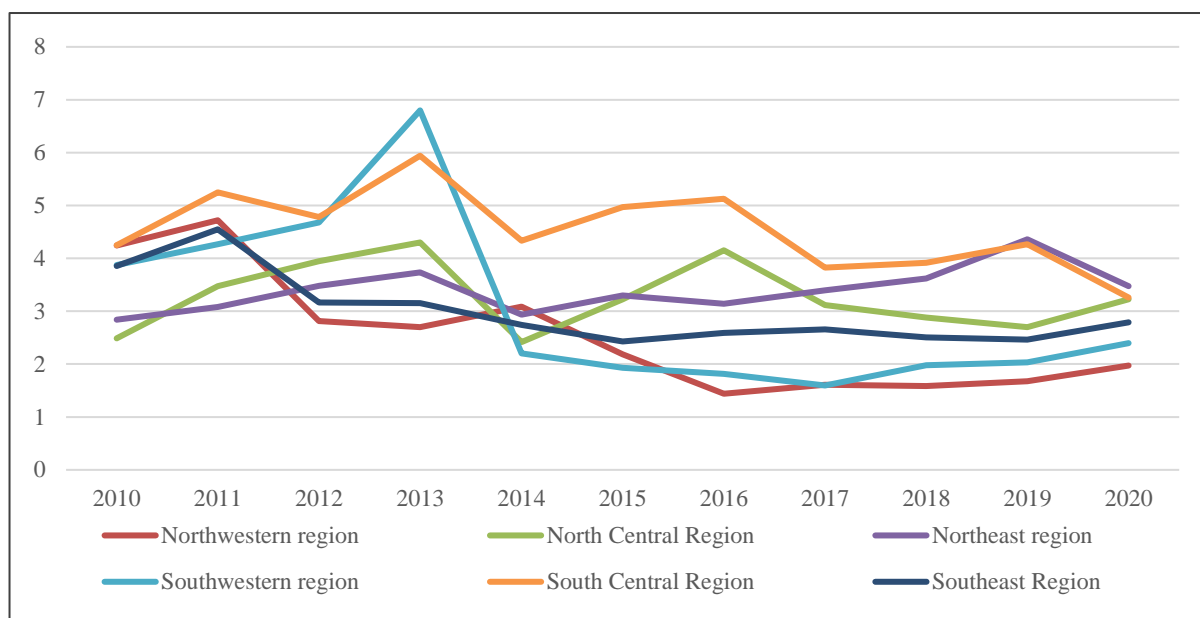

Source: author's calculations based on data from the Ministry of Agriculture and Food
*(*www.mzh.govermment.bg*)*

Figure 7. Dynamics of the liquidity ratio in Bulgarian agricultural holdings for the period 2010-2020.

When interpreting the estimates of the trend models, we established that in the North-West region, the liquidity ratio before 2010 was estimated at 4.94, and the average annual growth was negative until 2013, amounting to 0.48. In the following years, there was a shift in the direction of change and in the period from 2014 to 2020, the liquidity of farms increased by 0.07 on average per year. The liquidity ratio in the South-West region until 2010 was estimated at 3.16. In 2011, there was a one-off decrease, estimated at 1.04. In the first two years, liquidity increased by 0.69 on

average per year, and as a result of the change reported in 2011, the growth rate in the period 2012-2015 was negative, at 0.26 on average per year. The next change in the average annual change in the liquidity ratio occured after 2015, and for the period 2016-2020, a shift in the direction of change and an average annual increase of a minimum of 0.02 was recorded (Fig. 8).

Source: author's calculations based on data from the Ministry of Agriculture and Food
*(*www.mzh.govermment.bg*)*

Figure 8. Dynamics of the liquidity ratio in agricultural holdings at a regional level for the period 2010-2020.

Below are the forecast values of the liquidity ratio for the next six years. The point estimates were again extrapolated at a 95% confidence level. The results show that in the period 2021-2026, the liquidity ratio of farms in the country is expected to increase, reaching nearly 3.11 in 2023 and rising to 3.40 by 2026. The confidence interval of the forecast shows that in 2023 the expected liquidity is between 1.736 and 4.471, and in 2026 it will vary between 1.253 and 5.551.

An increase in liquidity is also expected at a regional level, the predicted value being 2.04 in the North-West region and 2.75 in the South-East region in 2023, while the predicted values are 2.24 for the North-West region and 2.84 for the South-East region in 2026. It is worth noting that the predicted values of the liquidity ratio in the North-West region are lower than those for the South-East region, the expected

liquidity ratios for both regions remaining lower than the national average for the entire forecast period 2021-2026.

III. Guidelines for Future Research on the Topic of the Dissertation

The issue of working capital management is not exhausted by the main research guidelines mentioned in the dissertation. The topic remains relevant and can be developed in the following aspects for further research:

- The proposed model for assessing working capital is "open" in nature. It may be continuously supplemented and updated by including new data from the published financial statements of agricultural enterprises.

- There are opportunities for continuously upgrading, enriching and improving the tools used for analysis and assessment, as well as for expanding the scope of the research, including by studying agricultural enterprises according to their size (number of employees), the size of the land they cultivate, the form of ownership, their product orientation and other features that constitute the demographics of the enterprises.

- The model developed in the dissertation thesis is based on external public information. At the same time, further research could expand the model by combining information from both external and internal sources.

IV. Reference to the Scientific and Applied Scientific Contributions of the Dissertation

1. The role and importance of working capital for the effective flow of production processes in enterprises and the possibilities for optimising financing in the long and short term to achieve sustainable positive financial results from a company's activities have been studied.

2. A critical analysis of the scientific literature is made, on the basis of which the essence of financial results and the concepts related to their formation are clarified – profit in different varieties (gross, taxable, balance sheet, undistributed) and forms (current, accumulated and undistributed), as well as the relationship between profit and the company's working capital.

3. Basic techniques and possibilities for econometric modelling of the working capital of agricultural holdings based on publicly available information are outlined.

4. Based on real data, an empirical analysis is conducted of the development and the sustainable trends in the dynamics of net working capital, net income and liquidity of agricultural holdings in Bulgaria for the period 2010-2020, for the country as a whole and by individual regions, identifying relevant specifics and regional differences.

5. Short-term forecasts for the development of net working capital, net income and liquidity of agricultural holdings in the country and by individual regions until 2026 are modelled and developed.

V. List of the Doctoral Student's Publications

Papers:

1. **Nenov, T.** (2021). Analysis of the market risk of McDonald's Corporation (MCD). Collection of scientific research from the annual conference of the Faculty of Economics of VTU "St. St. Cyril and Methodius", held on 27-28 May 2021 in Veliko Tarnovo – "Development of the Bulgarian and European economy – challenges and opportunities", Volume 5, pp. 171–174. https://www.uni-vt.bg/res/15603/Godishnik_stopanski_5_2021.pdf

2. **Nenov, T.** (2024). Working Capital Management in Agricultural Enterprises. Proceedings of University of Ruse, Vol. 63, Book 5.3, pp. 14–17. https://conf.uni-ruse.bg/bg/docs/sns/2024/FBM.pdf

3. **Nenov, T.** (2024). Study of the Relationship Between Turnover and Liquidity in the Agricultural Sector. Proceedings of University of Ruse, Vol. 63, Book 5.1, pp. 94-99. https://conf.uni-ruse.bg/bg/docs/cp24/5.1/5.1-15.pdf

VI. Reference for Compliance with the Minimum National Requirements under the Regulations for the Application of the Law on the Development of Academic Staff in the Republic of Bulgaria

Minimum national requirement in points: **30**

Publications by the author	*Points*
1. **Nenov, T.** (2021). Analysis of the market risk of McDonald's Corporation (MCD). Collection of scientific research from the annual conference of the Faculty of Economics of VTU "St. St. Cyril and Methodius", held on 27-28 May 2021 in Veliko Tarnovo - "Development of the Bulgarian and European economy - challenges and opportunities", https://www.uni-vt.bg/res/15603/Godishnik_stopanski_5_2021.pdf	10
2. **Nenov, T.** (2024). Working Capital Management in Agricultural Enterprises. Proceedings of University of Ruse, Vol. 63, Book 5.3, pp. 14–17. https://conf.uni-ruse.bg/bg/docs/sns/2024/FBM.pdf	10
3. **Nenov, T.** (2024). Study of the Relationship Between Turnover and Liquidity in the Agricultural Sector. Proceedings of University of Ruse, Vol. 63, Book 5.1, pp. 94-99. https://conf.uni-ruse.bg/bg/docs/cp24/5.1/5.1-15.pdf	10
TOTAL	*30*

Total points for the author: **30** = 30

VII. Declaration of Originality of the Dissertation

The dissertation paper, comprising 193 pages and entitled *„PROBLEMS OF MANAGEMENT OF WORKING CAPITAL IN AGRICULTURAL ENTERPRISES"*, is authentic and represents the author's own scientific work. It uses ideas, texts and visual elements by the author presented in graphs, diagrams, tables and formulas, in compliance with all requirements of the Copyright and Related Rights Act through proper citation and reference to the ideas of other authors and data, including:

1. The findings of the dissertation and the contributions made in it are original and have not been borrowed from research or publications in which the author has not participated.

2. The information presented by the author as copies of documents and publications, personally compiled references, etc. corresponds to the objective truth.

3. The scientific results obtained, described and/or published by other authors are duly and thoroughly cited in the bibliography.

Doctoral student:…..........................

/Teodor Nenov/