# ECONOMIC EFFICIENCY ASSESSMENT OF INVESTMENTS IN AGRICULTURAL PRODUCTION

*Boris Kuzman[1], Mirela Momčilović[2], Dajana Ercegovac[3], Dragana Milić[4]*

**Corresponding author E-mail: ercegovacdajana@gmail.com*

ARTICLE INFO

Original Article

Received: *30 June 2022*

Accepted: *30 September 2022*

doi: 10.59267/ekoPolj230161K

UDC 631.164

***Keywords***:

*investment evaluation, corn and soybean cultivation*

***JEL**: D22, G31*

ABSTRACT

The purpose of this study is to assess the economic benefits of agricultural production and provide guidance to manufacturers and investors interested in agriculture. This paper applies dynamic efficiency evaluation methods i.e. net present value, profitability index, and internal rate of return, together with the sensitivity analysis that is useful in cases of market turbulences. The presented investment is purchasing 10 hectares of arable land and cultivating two alternative crops: corn and soybeans. Research results and projections imply that both scenarios are acceptable and economically profitable with the preference for the cultivation of corn giving better economic efficiency. This study can provoke further investment evaluations with dynamic capital budgeting methods in other crops or implementation of mechanization in agricultural production.

## Introduction

Agricultural production is a significant pillar of the Serbian economy and exports. This is in line with Mihailović et al. (2014) who stated that primary agricultural production is the important determinant of the national economy, mainly due to its share in GDP and total employment, where agricultural production together with the food industry represents over 15% of Serbian GDP.

1 Boris Kuzman, PhD, Associate Professor, Institute of Agricultural Economics, Volgina Street 15, 11060 Belgrade, Serbia, Phone: +38163299111, E-mail: kuzmanboris@yahoo.com, ORCID ID (https://orcid.org/0000-0002-8661-2993)

2 Mirela Momčilović, PhD, Lecturer, Novi Sad Business School, Vladimira Perića Valtera 4, 21000 Novi Sad, Serbia, Phone: +38163280010, E-mail: bizniscentar@gmai.com, ORCID ID (https://orcid.org/0000-0001-5752-6992)

3 Dajana Ercegovac, PhD, Lecturer, Novi Sad Business School, Vladimira Perića Valtera 4, 21000 Novi Sad, Serbia, Phone: +381649834010, E-mail: ercegovacdajana@gmai.com, ORCID ID (https://orcid.org/0000-0002-6526-0773)

4 Dragana Milić, PhD, Lecturer, Novi Sad Business School, Vladimira Perića Valtera 4, 21000 Novi Sad, Serbia, Phone: +381638215979, E-mail: draganaim84@gmail.com, ORCID ID (https://orcid.org/0000-0001-8250-0479)

Ercegovac & Živkov (2018) based on data from the Statistical Office of the Republic of Serbia find that agricultural products, food, and raw materials were over 20% of national exports in 2016 and 2017. Study of Marković et al. (2022) imply that Serbian agri-food exports are resilient in the crisis situation (e.g. corona pandemic, 2019-2020).

Further development of the Serbian agriculture sector requires a significant increase in the agricultural budget and allocation of resources into investments for plant and livestock production and rural development programs (Kuzman et al., 2017). Investments are the base of the economic development and growth of companies with a close connection to a higher level of risks because of longer time duration and uncertain business conditions (Pantić et al., 2022; Момчиловић & Ерцеговац, 2022; Pavlović et al., 2021). Larger investments in Serbian agricultural holdings will contribute to food security, significant economic growth, greater exports, increase in employment in rural areas, and provide ecological equilibrium (Dašić et al., 2022). Profitable agricultural production is the base of the growth of national agricultural companies and individual producers. This study focus on the economic efficiency of agricultural production in order to help manufacturers to assess the benefits of investing in corn and soybean production. This research is also useful to a broad range of investors and researchers interested in financial analysis with dynamic efficiency methods like net present value, profitability index, and internal rate of return with sensitivity analysis which is applicable in cases of market uncertainty.

The paper is structured in four main sections where the first present the literature review; the second part describes data and used methodology; the third part provides the authors results and projections covering the structure of financing, loan repayment, the weighted average cost of capital, revenue and cost projections, income statement, cash flow, economic flow, and dynamic efficiency parameters of investments. After the results, in discussion the authors give an economic interpretation and comparison of two analyzed scenarios with implications for the decision-making of producers and investors. In concluding remarks the authors point out that both investment scenarios are acceptable giving the preference to the first scenario, investing in 10 hectares (ha) of arable land and cultivation of corn.

## Literature review

There are useful studies, both in domestic and foreign literature, that analyze and evaluate the economic efficiency of investments. Novković et al. (2006) examined the economic effects of investing in silo capacity expansion with the conclusion that the investment should be undertaken because the payback period is slightly higher than five years, the net present value of the investment is around 190,000 euros, and the internal rate of return is 13.01%. Novković et al. (2017) investigated the economic efficiency of investing in hazelnut plantation in the period of 10 years on an area of 0.5 hectares and the results showed that the project has a positive net present value of 1,212,200 dinars, the internal rate of return of the project is 16.97% with a payback period of eight years i.e. this project can be assessed as profitable. Vlaović Begović et al. (2018) assessed the economic efficiency

of purchasing 10 hectares of agricultural land for corn cultivation using several dynamic methods of capital budgeting with the following results and conclusion: the net present value of the investment is 43,415 euros, the internal rate of return is 9.91%, the profitability index is 1.22, which imply that this investment should be implemented. Baruwa and Fabode (2019) evaluated the investments in the layer and broiler production with results that showed that both investments are acceptable but the investment in layer production has a higher, positive net present value and the value of the internal rate of return compared to the investment in the production of broilers, as well as a shorter discounted payback period. Lopes Santos et al. (2020) investigated two soybean cultivation systems using three different price scenarios and discounted cash flows of the investment (which includes the net present value method), as well as cost-volume-profit analysis. The authors point out that soybean production is profitable, with different strategies, property production profiles and price scenarios, if it is performed on land size between 29 ha, and 1,065 ha.

Subić (2017) examined the economic efficiency of purchasing agricultural land, as well as the procurement of machinery for agricultural production. On the base of dynamic efficiency methods and investment evaluation methods in conditions of uncertainty, author find that investment is justified in all analyzed cases. Subić et al. (2017) evaluated two investment scenarios: conventional raspberry plantations vs raspberry plantations that include investing in a mobile solar robotic generator. The assessment of the investment projects was performed using the net present value, internal rate of return, payback period, and break-even point with the conclusion that investing in a renewable electrical energy device during the production of raspberries, has a high economic justification. Besides traditional agricultural production, Radić et al. (2022) highlighted the potentials and challenges of the "smart agriculture" i.e. Internet of Things, big data, satellite navigation, mobile communications, and ubiquitous computing in agriculture. New trends of a demographic boom, fast urbanization, and increased demand for food, induced the efforts in developing sustainable technologies that would improve production, increase yields, direct efficient water use and provide more efficient agricultural operations.

## Materials and methods

The investment project evaluated in this paper is being conducted for the private company "X" founded in 1994 and located in the area of Stara Pazova municipality. The main activity of the company is farming and agricultural production. The company considers investing in 10 ha of arable land and cultivating corn or soybeans. Therefore, a comparative analysis of the cultivation of corn against soybean is done in the paper. For this purpose, two scenarios are assessed based on the project's economic life of 10 years. Projection of the income statement, cash, and economic flow of the investment project is carried out, and the project is evaluated based on the net present value, profitability index, and internal rate of return. Net present value as the investment evaluation method is broadly used (see e.g. Peterson & Fabozzi, 2002; Damodaran, 2015; Todorović & Ivanišević, 2018; CFA Institute, 2020). Profitability index as a relative measure with fewer shortcomings compared to an internal rate of return (see Peterson & Fabozzi,

2002) is also used in this paper. *Table 1* presents the formulas used for the assessment of the acceptability of an investment. These methods are chosen since they are the most often used dynamic methods for investment evaluation in Serbia according to the survey of 64 companies performed by Todorovic et al. (2015). There are similar studies about investment decision-making, see e.g. Graham & Harvey, 2001; Dedi & Orsag, 2007; Correia, 2012; Andres, Fuente & San Matin, 2015; Tešić et al., 2021). Evaluation of investments also includes the use of sensitivity analyses to assess investment efficiency in uncertain conditions. This method is selected due to the instability of the commodity markets caused by the war in Ukraine, increasing inflation, and global supply chain problems that were present from the beginning of 2022.

**Table 1.** The methods used for the evaluation of investment projects

| Methods | Symbol | Formula | Acceptance rule |
|---|---|---|---|
| Net present value | NPV | $NPV = \sum_{t=1}^{n} \frac{NNT_t}{(1+r)^t} - C$ | $NPV \geq 0$ |
| Profitability index | PI | $PI = \frac{\sum_{t=1}^{n} \frac{NNT_t}{(1+r)^t}}{C}$ | $PI \geq 1$ |
| Internal rate of return | IRR | $C = \sum_{t=1}^{n} \frac{NNT_t}{(1+IRR)^t}$ | $IRR \geq r$ |

*Source:* Stančić, Čupić (2020).

*Note:* $NNT_t$ represents net inflow or net cash flow of the project, $C$ is a total investment, $r$ is the discount rate, and $n$ represents the expected economic life of the project.

The project is financed through a combination of equity (own capital), and debt. In *Table 2* is presented the assessment of the investment discount rate. The discount rate is determined based on the weighted average cost of capital (WACC) formula. The cost of the equity is determined based on the capital asset pricing model (CAPM), and its beta is calculated based on the formula for a levered beta.

**Table 2.** The assessment of investment discount rate

| Methods | Formula |
|---|---|
| WACC | $r = \frac{E}{V} r_e + \frac{D}{V} r_d(1-t)$; $V = E + D$ |
| CAPM | $r_e = r_f + \beta_L (r_m - r_f)$ |
| Levered beta | $\beta_L = \beta_U (1 + (1-t)\frac{D}{E}$. |

*Source:* Damodaran (2005).

*Note:* rr is the discount rate, $E$ is equity, $D$ is debt, $V$ is the total value of invested capital, $r_e$ represents the cost of equity, $r_d$ represents the cost of debt, $r_f$ is the risk-free rate of return, $r_m$ represents the rate of return of the market portfolio, $\beta_L$ is levered beta, $\beta_U$ is unlevered beta, and $t$ represents tax rate.

Data necessary for the calculations is obtained based on the interview with the management of the company "X" and internet sources. All values displayed in the paper are expressed in EUR. The price of 1 ha of arable land in the area of Stara Pazova municipality is 20.000 EUR. The project is financed 70 percent from equity, and 30 percent from credit arrangement. *Table 3* presents the current prices of corn and soybean, as well as their yield. *Table 4* presents data necessary for the determination of variable cost. Fixed costs encompass assessed wages for the employees at the level of 500 EUR for 10 ha. Amortization of the land is not included in the fixed costs, because land does not lose value with exploitation. Projection of revenues, variable and fixed costs are done based on the growth rate that is equal to expected inflation in the EU according to data from Statista, (2022): 1.89 percent in 2022, 1.61 percent in 2023, 1.72 percent in 2024, 1.78 percent in 2025, 1.85 percent in 2026. The inflation for the remaining years of the economic life of the investment is determined as the average of inflation rates in previous years of the project. The cost of debt (external capital) is based on the interest rate of 4.75 percent on the loan that matures in 10 years. As an approximation for the risk-free rate is taken the yield on the 10-year German government-owned bond 0.945 percent (Trading Economics, 2022). The equity risk premium for the German market amounts to 4.24 percent, the country risk premium for Serbia is 2.97 percent and the unlevered beta for emerging markets for agriculture and farming is 0.74 (Damodaran, 2022).

**Table 3.** Prices and yields of corn and soybean

| Indicators | Corn (EUR/ton) | Soybean (EUR/ton) |
|---|---|---|
| Price in EUR/ton, 30.04.2022. | 288.93 | 713.82 |
| Yield (ton/ha) | 11.00 | 3.50 |

*Source:* Current prices are obtained from NS COMEX, 2022. Yield data are obtained from the management of the company, 2022.

**Table 4.** The variable cost data

| Variable costs | Corn (EUR/ha) | Soybean (EUR/ha) |
|---|---|---|
| Raw materials | | |
| - Seed | 186.95 | 115.57 |
| - Mineral fertilizer (and urea) | 607.90 | 200.00 |
| - Pesticides | 50.99 | 50.99 |
| Mechanical work | | |
| - Plowing | 101.97 | 101.97 |
| - Sowing | 33.99 | 33.99 |

| Variable costs | Corn (EUR/ha) | Soybean (EUR/ha) |
|---|---|---|
| - Spraying | 50.99 | 50.99 |
| - Cultivation | 25.49 | 25.49 |
| - Harvesting | 93.48 | 100.00 |
| - Piking and transport | 100.00 | 100.00 |
| - Preparation | 33.99 | 33.99 |

*Source:* Data obtained from the management of the company, 2022.

## Results

The total investment within the two observed scenarios differed in absolute values of investment, but the differences are small and come from the investment in working capital. According to the two observed scenarios, it is necessary to invest approximately 210,000 EUR (*Table 5*). The company intended to finance 30 percent of the total investment from the bank loan. External capital is used for purchasing the land, while own capital is used for the financing of the working capital, and remaining investment in land (*Table 6*).

**Table 5.** The structure of investments in corn and soybean cultivation

| No | Indicators | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|---|
| | | Amount (EUR) | Share (%) | Amount (EUR) | Share (%) |
| I | Fixed assets | 200,000 | 94 | 200,000 | 96 |
| 1. | Land 10 ha | 200,000 | 94 | 200,000 | 96 |
| II | Working capital | 13,358 | 6 | 8,630 | 4 |
| | **Total:** | 213,358 | 100 | 208,630 | 100 |

*Source:* Authors' calculation

**Table 6.** The structure of financing sources of investments

| No | Indicators | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|---|
| | | Amount (EUR) | Share (%) | Amount (EUR) | Share (%) |
| **I** | **Own capital** | 149,350 | 70 | 146,041 | 70 |
| 1. | Land 10 ha | 135,993 | 64 | 137,411 | 66 |
| 2. | Working capital | 13,358 | 6 | 8,630 | 4 |
| **II** | **External capital** | 64,007 | 30 | 62,589 | 30 |
| 1. | Land 10 ha | 64,007 | 30 | 62,589 | 30 |
| | **Total:** | 213,358 | 100 | 208,630 | 100 |

*Source:* Authors' calculation

To finance the project, a loan is provided from a commercial bank with an interest rate of 4.75 percent, and a repayment period of 10 years. The repayment is done in equal annuities. The difference between determined annuities of the loan for two scenarios comes from the difference between initial amounts of loans for the growth of corn, and soybean (*Table 7*).

**Table 7.** The loan repayment dynamics (in EUR)

| No | Description | Years | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Scenario 1** | | | | | | | | | | | |
| 1 | Interest expense | 3,040 | 2,796 | 2,540 | 2,271 | 1,990 | 1,696 | 1,387 | 1,064 | 726 | 371 |
| 2 | Debt repayment | 5,149 | 5,393 | 5,649 | 5,918 | 6,199 | 6,493 | 6,802 | 7,125 | 7,463 | 7,818 |
| | **Total:** | **8,189** | **8,189** | **8,189** | **8,189** | **8,189** | **8,189** | **8,189** | **8,189** | **8,189** | **8,189** |
| **Scenario 2** | | | | | | | | | | | |
| 1 | Interest expense | 2,973 | 2,734 | 2,483 | 2,221 | 1,946 | 1,658 | 1,357 | 1,041 | 710 | 363 |
| 2 | Debt repayment | 5,034 | 5,274 | 5,524 | 5,786 | 6,061 | 6,349 | 6,651 | 6,967 | 7,298 | 7,644 |
| | **Total:** | **8,007** | **8,007** | **8,007** | **8,007** | **8,007** | **8,007** | **8,007** | **8,007** | **8,007** | **8,007** |

*Source:* Authors' calculation

Levered beta is calculated based on Damodaran's emerging markets unlevered beta for agriculture and farming, the D/E ratio of the project, and an income tax rate of 15 percent, and it amounted to a little above 1. The cost of equity is determined based on the CAPM formula, and it amounted to 8.20 percent for both scenarios (*Table 8*). The cost of debt represented the bank interest rate corrected for the income tax rate of 15 percent, which amounted to 4.04 percent for both scenarios. From *Table 9*, it can be seen that the weighted average cost of capital is 6.95 percent.

**Table 8.** The cost of equity

| No | Indicators | Scenario 1 | Scenario 2 |
|---|---|---|---|
| 1 | Unlevered beta for agriculture and farming | 0.74000 | 0.74000 |
| 2 | Tax rate (15%) | 0.15000 | 0.15000 |
| 3 | D/E | 0.42857 | 0.42857 |
| | **Levered beta** | **1.00957** | **1.00957** |
| 1 | Risk-free rate for German market | 0.00945 | 0.00945 |
| 2 | Levered beta | 1.00957 | 1.00957 |
| 2 | Equity risk premium for German market | 0.00424 | 0.00424 |
| 3 | Serbian country risk premium | 0.00297 | 0.00297 |
| | **CAPM** | **0.08196** | **0.08196** |

*Source:* Authors' calculation

**Table 9.** The weighted average cost of capital

| No | Indicators | Scenario 1 | | | Scenario 2 | | |
|---|---|---|---|---|---|---|---|
| | | Share (%) | Interest rate (%) | Discount rate (%) | Share (%) | Interest rate | Discount rate (%) |
| I | Own capital | 70 99,300 | 8.20 | 5.74 | 70 95,99130 | 8.20 | 5.74 |
| II | External capital | 30 | 4.04 | 1.21 | 30 | 4.04 | 1.21 |
| | **Total:** | **100** | | **6.95** | **100** | | **6.95** |

*Source:* Authors' calculation

The total revenue for the first year of the project is determined for both scenarios based on the expected yields, and redemption prices of corn/soybeans, while the projection of the revenue for the remaining years is done by correcting the revenue for the expected rate of inflation in EU. *Table 10* presents obtained results, and it shows that corn cultivation resulted in a higher level of sales revenue compared to soybean cultivation.

**Table 10.** The projected revenue of investments (in EUR)

| No | Description | Years | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Scenario 1** | | | | | | | | | | | |
| 1 | Revenue from sales | 36,116 | 36,697 | 37,329 | 37,993 | 38,696 | 39,381 | 40,078 | 40,787 | 41,509 | 42,244 |
| | **Total:** | **36,116** | **36,697** | **37,329** | **37,993** | **38,696** | **39,381** | **40,078** | **40,787** | **41,509** | **42,244** |
| **Scenario 2** | | | | | | | | | | | |
| 1 | Revenue from sales | 29,980 | 30,463 | 30,987 | 31,539 | 32,122 | 32,691 | 33,269 | 33,858 | 34,457 | 35,067 |
| | **Total:** | **29,980** | **30,463** | **30,987** | **31,539** | **32,122** | **32,691** | **33,269** | **33,858** | **34,457** | **35,067** |

*Source:* Authors' calculation

Table 11 presents the structure of the total costs of investment in the cultivation of corn/soybean at 10 ha of land. Cultivation of corn required substantial investment in material costs. The majority of corn production material costs came from the cost of mineral fertilizers, urea, and seed. On the other hand, in the first years of the economic life of corn cultivation, the highest immaterial cost was interest, but it is reduced as the loan gets paid off. Significant immaterial costs of corn cultivations were costs of plowing, picking, transporting, and harvesting.

The cultivation of soybean had lower material costs compared with the material costs of corn cultivation (*Table 11*). The most significant material cost in soybean cultivation was the cost of mineral fertilizers. The interest cost was the most substantial immaterial

cost of soybean cultivation in the first years of the economic life of the project. However, it is reduced with the repayment of the loan. Costs of plowing, harvesting, picking and transport in soybean cultivation were considerable, as in corn cultivation. It should be pointed out that the total costs of soybean cultivation were lower compared to corn cultivation, due to lower material costs.

**Table 11.** The projected costs of investments (in EUR)

| No | Description | Years | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Scenario 1** | | | | | | | | | | | |
| **I** | **Material costs** | **8,458** | **8,595** | **8,742** | **8,898** | **9,063** | **9,223** | **9,386** | **9,552** | **9,721** | **9,894** |
| 1 | Seed | 1,870 | 1,900 | 1,932 | 1,967 | 2,003 | 2,039 | 2,075 | 2,111 | 2,149 | 2,187 |
| 2 | Mineral fertilizers | 6,079 | 6,177 | 6,283 | 6,395 | 6,513 | 6,629 | 6,746 | 6,865 | 6,987 | 7,110 |
| 3 | Pesticides | 510 | 518 | 527 | 536 | 546 | 556 | 566 | 576 | 586 | 596 |
| **II** | **Immaterial costs** | **7,939** | **7,774** | **7,603** | **7,425** | **7,239** | **7,038** | **6,824** | **6,597** | **6,357** | **6,102** |
| 1 | Plowing | 1,020 | 1,036 | 1,054 | 1,073 | 1,093 | 1,112 | 1,132 | 1,152 | 1,172 | 1,193 |
| 2 | Sowing | 340 | 345 | 351 | 358 | 364 | 371 | 377 | 384 | 391 | 398 |
| 3 | Spraying | 510 | 518 | 527 | 536 | 546 | 556 | 566 | 576 | 586 | 596 |
| 4 | Cultivation | 255 | 259 | 263 | 268 | 273 | 278 | 283 | 288 | 293 | 298 |
| 5 | Harvesting | 935 | 950 | 966 | 983 | 1,002 | 1,019 | 1,037 | 1,056 | 1,074 | 1,093 |
| 6 | Piking and transport | 1,000 | 1,016 | 1,034 | 1,052 | 1,071 | 1,090 | 1,110 | 1,129 | 1,149 | 1,170 |
| 7 | Preparation | 340 | 345 | 351 | 358 | 364 | 371 | 377 | 384 | 391 | 398 |
| 8 | Labor | 500 | 508 | 517 | 526 | 536 | 545 | 555 | 565 | 575 | 585 |
| 9 | Interest | 3,040 | 2,796 | 2,540 | 2,271 | 1,990 | 1,696 | 1,387 | 1,064 | 726 | 371 |
| | **Total (I+II):** | **16,398** | **16,368** | **16,346** | **16,323** | **16,302** | **16,261** | **16,210** | **16,149** | **16,078** | **15,995** |
| **Scenario 2** | | | | | | | | | | | |
| **I** | **Material costs** | **3,666** | **3,725** | **3,789** | **3,856** | **3,927** | **3,997** | **4,068** | **4,140** | **4,213** | **4,288** |
| 1 | Seed | 1,156 | 1,174 | 1,195 | 1,216 | 1,238 | 1,260 | 1,282 | 1,305 | 1,328 | 1,352 |
| 2 | Mineral fertilizers | 2,000 | 2,032 | 2,067 | 2,104 | 2,143 | 2,181 | 2,219 | 2,259 | 2,299 | 2,339 |
| 3 | Pesticides | 510 | 518 | 527 | 536 | 546 | 556 | 566 | 576 | 586 | 596 |
| **II** | **Immaterial costs** | **7,937** | **7,778** | **7,614** | **7,443** | **7,265** | **7,071** | **6,866** | **6,647** | **6,415** | **6,170** |
| 1 | Plowing | 1,020 | 1,036 | 1,054 | 1,073 | 1,093 | 1,112 | 1,132 | 1,152 | 1,172 | 1,193 |
| 2 | Sowing | 340 | 345 | 351 | 358 | 364 | 371 | 377 | 384 | 391 | 398 |
| 3 | Spraying | 510 | 518 | 527 | 536 | 546 | 556 | 566 | 576 | 586 | 596 |
| 4 | Cultivation | 255 | 259 | 263 | 268 | 273 | 278 | 283 | 288 | 293 | 298 |
| 5 | Harvesting | 1,000 | 1,016 | 1,034 | 1,052 | 1,071 | 1,090 | 1,110 | 1,129 | 1,149 | 1,170 |
| 6 | Piking and transport | 1,000 | 1,016 | 1,034 | 1,052 | 1,071 | 1,090 | 1,110 | 1,129 | 1,149 | 1,170 |
| 7 | Preparation | 340 | 345 | 351 | 358 | 364 | 371 | 377 | 384 | 391 | 398 |
| 8 | Labor | 500 | 508 | 517 | 526 | 536 | 545 | 555 | 565 | 575 | 585 |
| 9 | Interest | 2,973 | 2,734 | 2,483 | 2,221 | 1,946 | 1,658 | 1,357 | 1,041 | 710 | 363 |
| | **Total (I+II):** | **11,603** | **11,503** | **11,403** | **11,299** | **11,193** | **11,068** | **10,933** | **10,787** | **10,628** | **10,457** |

*Source:* Authors' calculation

*Table 12* presents the projection of income statement for both scenarios that include buying 10 ha of arable land and growing corn or soybean. It can be seen from *Table 12* that both investment scenarios had a positive financial result in all years of the economic life of the project. However, according to the projected statements, the cultivation of corn is more profitable.

**Table 12.** The income statement of investments (in EUR)

| No | Description | Years | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Scenario 1** | | | | | | | | | | | |
| **1** | **Total revenue** | **31,782** | **32,294** | **32,849** | **33,434** | **34,052** | **34,655** | **35,268** | **35,893** | **36,528** | **37,175** |
| 1.1 | Operating revenue | 31,782 | 32,294 | 32,849 | 33,434 | 34,052 | 34,655 | 35,268 | 35,893 | 36,528 | 37,175 |
| **2** | **Total expenses** | **16,398** | **16,368** | **16,346** | **16,323** | **16,302** | **16,261** | **16,210** | **16,149** | **16,078** | **15,995** |
| 2.1. | Operating expenses (2.1.1+2.1.2 +2.1.3+2.1.4) | 13,358 | 13,573 | 13,806 | 14,052 | 14,312 | 14,565 | 14,823 | 15,085 | 15,352 | 15,624 |
| | 2.1.1 Material cost | 8,458 | 8,595 | 8,742 | 8,898 | 9,063 | 9,223 | 9,386 | 9,552 | 9,721 | 9,894 |
| | 2.1.2 Depreciation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2.1.3 Immat. cost without interest* | 4,899 | 4,978 | 5,064 | 5,154 | 5,249 | 5,342 | 5,437 | 5,533 | 5,631 | 5,730 |
| **3** | **Operating profit** | **18,424** | **18,721** | **19,043** | **19,382** | **19,741** | **20,090** | **20,446** | **20,808** | **21,176** | **21,551** |
| 4 | Financial expenses | 3,040 | 2,796 | 2,540 | 2,271 | 1,990 | 1,696 | 1,387 | 1,064 | 726 | 371 |
| **5** | **Profit before taxes** | **15,384** | **15,925** | **16,503** | **17,111** | **17,750** | **18,394** | **19,058** | **19,743** | **20,450** | **21,179** |
| 6 | Income taxes (15%) | 2,308 | 2,389 | 2,476 | 2,567 | 2,663 | 2,759 | 2,859 | 2,961 | 3,067 | 3,177 |
| **7** | **Net profit** | **13,076** | **13,537** | **14,028** | **14,544** | **15,088** | **15,635** | **16,200** | **16,782** | **17,382** | **18,002** |
| **Scenario 2** | | | | | | | | | | | |
| **1** | **Total revenue** | **24,984** | **25,386** | **25,823** | **26,282** | **26,768** | **27,242** | **27,724** | **28,215** | **28,715** | **29,223** |
| 1.1 | Operating revenue | 24,984 | 25,386 | 25,823 | 26,282 | 26,768 | 27,242 | 27,724 | 28,215 | 28,715 | 29,223 |
| **2** | **Total expenses** | **11,603** | **11,503** | **11,403** | **11,299** | **11,193** | **11,068** | **10,933** | **10,787** | **10,628** | **10,457** |
| 2.1. | Operating expenses (2.1.1+2.1.2 +2.1.3+2.1.4) | 8,630 | 8,769 | 8,920 | 9,078 | 9,246 | 9,410 | 9,577 | 9,746 | 9,919 | 10,094 |
| | 2.1.1 Material cost | 3,666 | 3,725 | 3,789 | 3,856 | 3,927 | 3,997 | 4,068 | 4,140 | 4,213 | 4,288 |
| | 2.1.2 Depreciation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2.1.3 Immat. cost without interest* | 4,964 | 5,044 | 5,131 | 5,222 | 5,319 | 5,413 | 5,509 | 5,606 | 5,706 | 5,807 |
| **3** | **Operating profit** | **16,354** | **16,617** | **16,903** | **17,204** | **17,522** | **17,832** | **18,148** | **18,469** | **18,796** | **19,129** |
| 4 | Financial expenses | 2,973 | 2,734 | 2,483 | 2,221 | 1,946 | 1,658 | 1,357 | 1,041 | 710 | 363 |
| **5** | **Profit before taxes** | **13,381** | **13,883** | **14,419** | **14,983** | **15,576** | **16,174** | **16,791** | **17,428** | **18,086** | **18,765** |
| 6 | Income taxes (15%) | 2,007 | 2,082 | 2,163 | 2,247 | 2,336 | 2,426 | 2,519 | 2,614 | 2,713 | 2,815 |
| **7** | **Net profit** | **11,374** | **11,801** | **12,257** | **12,735** | **13,240** | **13,748** | **14,272** | **14,814** | **15,373** | **15,951** |

*Source:* Authors' calculation

Note:* Immaterial costs do not contain the interest cost of the loan (financial expenses).

The cash flow of the two proposed investments is presented in *Table 13*. The table shows that two scenarios generated a positive net inflow in each observed year of the cash flow statement. In the last year, both scenarios had significantly higher net inflow compared to previous years, because of the high level of land's residual value, as well as the residual value of working capital. The residual value of land was significant because it does not lose value with its use. It should be pointed out that the corn cultivation project had a higher level of cumulative cash flow compared to the project of soybean cultivation (303,625 EUR compared to 281,605 EUR).

From *Table 14*, it can be seen that the net inflows of the economic flow statement were positive in all years of the economic life of both scenarios, except in the year of implementation of investments. Negative net inflow in year zero of two scenarios results from the investment that amounts to 213,358 EUR in case of corn production and 208,630 EUR in case of soybean production. The total cumulative net inflow of the first scenario was higher compared to the second scenario (172,156 EUR compared to 153,049 EUR).

**Table 13.** The cash flow of investments (in EUR)

| No | Description | Years | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Scenario 1** | | | | | | | | | | | | |
| **I** | **Total inflow** | **213,358** | **31,782** | **32,294** | **32,849** | **33,434** | **34,052** | **34,655** | **35,268** | **35,893** | **36,528** | **250,532** |
| 1 | Total revenue | 0.00 | 31,782 | 32,294 | 32,849 | 33,434 | 34,052 | 34,655 | 35,268 | 35,893 | 36,528 | 37,175 |
| 2 | Sources of financing | 213,358 | | | | | | | | | | |
| 2.1 | Own capital | 149,350 | | | | | | | | | | |
| 2.2 | External capital | 64,007 | | | | | | | | | | |
| 3 | Residual value | | | | | | | | | | | 213,358 |
| 3.1 | Fixed assets | | | | | | | | | | | 200,000 |
| 3.2 | Working capital | | | | | | | | | | | 13,358 |
| **II** | **Total outflow** | **213,358** | **23,854** | **24,150** | **24,470** | **24,807** | **25,163** | **25,513** | **25,870** | **26,236** | **26,609** | **26,990** |
| 1 | Value of investment | 213,358 | | | | | | | | | | |
| 2 | Material costs | | 8,458 | 8,595 | 8,742 | 8,898 | 9,063 | 9,223 | 9,386 | 9,552 | 9,721 | 9,894 |
| 3 | Immat. costs without inter. | | 4,899 | 4,978 | 5,064 | 5,154 | 5,249 | 5,342 | 5,437 | 5,533 | 5,631 | 5,730 |
| 4 | Loan liabilities | | 8,189 | 8,189 | 8,189 | 8,189 | 8,189 | 8,189 | 8,189 | 8,189 | 8,189 | 8,189 |
| 5 | Income tax (15%) | | 2,308 | 2,389 | 2,476 | 2,567 | 2,663 | 2,759 | 2,859 | 2,961 | 3,067 | 3,177 |
| **III** | **Net inflow (I-II)** | **0** | **7,928** | **8,143** | **8,379** | **8,627** | **8,889** | **9,142** | **9,398** | **9,657** | **9,919** | **223,542** |
| **Scenario 2** | | | | | | | | | | | | |
| **I** | **Total inflow** | **208,630** | **24,984** | **25,386** | **25,823** | **26,282** | **26,768** | **27,242** | **27,724** | **28,215** | **28,715** | **237,853** |
| 1 | Total revenue | 0 | 24,984 | 25,386 | 25,823 | 26,282 | 26,768 | 27,242 | 27,724 | 28,215 | 28,715 | 29,223 |
| 2 | Sources of financing | 208,630 | | | | | | | | | | |
| 2.1 | Own capital | 146,041 | | | | | | | | | | |
| 2.2 | External capital | 62,589 | | | | | | | | | | |
| 3 | Residual value | | | | | | | | | | | 208,630 |
| 3.1 | Fixed assets | | | | | | | | | | | 200,000 |
| 3.2 | Working capital | | | | | | | | | | | 8,630 |
| **II** | **Total outflow** | **208,630** | **18,645** | **18,859** | **19,090** | **19,333** | **19,590** | **19,844** | **20,103** | **20,368** | **20,639** | **20,917** |
| 1 | Value of investment | 208,630 | | | | | | | | | | |
| 2 | Material costs | | 3,666 | 3,725 | 3,789 | 3,856 | 3,927 | 3,997 | 4,068 | 4,140 | 4,213 | 4,288 |
| 3 | Immaterial costs without inter. | | 4,964 | 5,044 | 5,131 | 5,222 | 5,319 | 5,413 | 5,509 | 5,606 | 5,706 | 5,807 |
| 4 | Loan liabilities | | 8,007 | 8,007 | 8,007 | 8,007 | 8,007 | 8,007 | 8,007 | 8,007 | 8,007 | 8,007 |

| No | Description | Years | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | Income tax (15%) | | 2,007 | 2,082 | 2,163 | 2,247 | 2,336 | 2,426 | 2,519 | 2,614 | 2,713 | 2,815 |
| **III** | **Net inflow (I-II)** | **0** | **6,339** | **6,527** | **6,732** | **6,949** | **7,178** | **7,399** | **7,622** | **7,847** | **8,075** | **216,936** |

*Source:* Authors' calculation

**Table 14.** The economic flow of investments (in EUR)

| No | Description | Years | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Scenario 1** | | | | | | | | | | | | |
| **I** | **Total inflow** | **0** | **31,782** | **32,294** | **32,849** | **33,434** | **34,052** | **34,655** | **35,268** | **35,893** | **36,528** | **250,532** |
| 1 | Total revenue | 0 | 31,782 | 32,294 | 32,849 | 33,434 | 34,052 | 34,655 | 35,268 | 35,893 | 36,528 | 37,175 |
| 2 | Residual value | | | | | | | | | | | 213,358 |
| 2.1 | Fixed assets | | | | | | | | | | | 200,000 |
| 2.2 | Working capital | | | | | | | | | | | 13,358 |
| **II** | **Total outflow** | **213,358** | **15,665** | **15,961** | **16,282** | **16,618** | **16,974** | **17,324** | **17,682** | **18,047** | **18,420** | **18,801** |
| 1 | Value of investment | 213,358 | | | | | | | | | | |
| 1.1 | Fixed assets | 200,000 | | | | | | | | | | |
| 1.2 | Working capital | 13,358 | | | | | | | | | | |
| 2 | Material costs | 0 | 8,458 | 8,595 | 8,742 | 8,898 | 9,063 | 9,223 | 9,386 | 9,552 | 9,721 | 9,894 |
| 3 | Immat. costs without interest | 0 | 4,899 | 4,978 | 5,064 | 5,154 | 5,249 | 5,342 | 5,437 | 5,533 | 5,631 | 5,730 |
| 4 | Income tax (15%) | 0 | 2,308 | 2,389 | 2,476 | 2,567 | 2,663 | 2,759 | 2,859 | 2,961 | 3,067 | 3,177 |
| **III** | **Net income (I-II)** | **-213,358** | **16,117** | **16,332** | **16,568** | **16,815** | **17,078** | **17,331** | **17,587** | **17,846** | **18,108** | **231,731** |
| **Scenario 2** | | | | | | | | | | | | |
| **I** | **Total inflow** | **0** | **24,984** | **25,386** | **25,823** | **26,282** | **26,768** | **27,242** | **27,724** | **28,215** | **28,715** | **237,853** |
| 1 | Total revenue | 0 | 24,984 | 25,386 | 25,823 | 26,282 | 26,768 | 27,242 | 27,724 | 28,215 | 28,715 | 29,223 |
| 2 | Residual value | | | | | | | | | | | 208,630 |
| 2.1 | Fixed assets | | | | | | | | | | | 200,000 |
| 2.2 | Working capital | | | | | | | | | | | 8,630 |
| **II** | **Total outflow** | **208,630** | **10,637** | **10,851** | **11,083** | **11,326** | **11,583** | **11,836** | **12,095** | **12,360** | **12,632** | **12,909** |
| 1 | Value of investment | 208,630 | | | | | | | | | | |
| 1.1 | Fixed assets | 200,000 | | | | | | | | | | |
| 1.2 | Working capital | 8,630 | | | | | | | | | | |
| 2 | Material costs | 0 | 3,666 | 3,725 | 3,789 | 3,856 | 3,927 | 3,997 | 4,068 | 4,140 | 4,213 | 4,288 |
| 3 | Immat. cost without interest | 0 | 4,964 | 5,044 | 5,131 | 5,222 | 5,319 | 5,413 | 5,509 | 5,606 | 5,706 | 5,807 |
| 4 | Income tax (15%) | 0 | 2,007 | 2,082 | 2,163 | 2,247 | 2,336 | 2,426 | 2,519 | 2,614 | 2,713 | 2,815 |
| **III** | **Net inflow (I-II)** | **-208,630** | **14,347** | **14,535** | **14,740** | **14,956** | **15,186** | **15,406** | **15,629** | **15,855** | **16,083** | **224,944** |

*Source:* Authors' calculation

The dynamic methods of assessment of investment's acceptability require that all net inflows/outflows that come from the different periods of investment are brought to the present moment based on discounting technique. The appropriate discount rate is the weighted average cost of capital, as it was already determined. *Table 15* shows the results of net present value, profitability index, and internal rate of return for both scenarios.

**Table 15.** Net present value, profitability index, and internal rate of return

| **Scenario 1** | | | |
|---|---|---|---|
| **Year** | **Net inflows (EUR)** | **Discount factor** | **Present value (EUR)** |
| 0 | -213,358 | 1.0000 | -213,358 |
| 1 | 16,117 | 0.9350 | 15,070 |
| 2 | 16,332 | 0.8743 | 14,279 |
| 3 | 16,568 | 0.8175 | 13,544 |
| 4 | 16,815 | 0.7644 | 12,853 |
| 5 | 17,078 | 0.7147 | 12,206 |
| 6 | 17,331 | 0.6683 | 11,582 |
| 7 | 17,587 | 0.6249 | 10,989 |
| 8 | 17,846 | 0.5843 | 10,427 |
| 9 | 18,108 | 0.5463 | 9,893 |
| 10 | 231,731 | 0.5108 | 118,373 |
| Present value of net inflows (for years from 1 to 10) | | | 229,216 |
| **Net present value (NSV)** | | | **15,858** |
| **Profitability index (IP)** | | | **1.07** |
| **Internal rate of return (IRR)** | | | **7.99%** |
| **Scenario 2** | | | |
| **Year** | **Net inflows (EUR)** | **Discount factor** | **Present value (EUR)** |
| 0 | -208,630 | 1.0000 | -208,630 |
| 1 | 14,347 | 0.9350 | 13,415 |
| 2 | 14,535 | 0.8743 | 12,707 |
| 3 | 14,740 | 0.8175 | 12,050 |
| 4 | 14,956 | 0.7644 | 11,432 |
| 5 | 15,186 | 0.7147 | 10,853 |
| 6 | 15,406 | 0.6683 | 10,296 |
| 7 | 15,629 | 0.6249 | 9,766 |
| 8 | 15,855 | 0.5843 | 9,263 |
| 9 | 16,083 | 0.5463 | 8,786 |
| 10 | 224,944 | 0.5108 | 114,905 |
| Present value of net inflows (for years from 1 to 10) | | | 213,474 |
| **Net present value (NSV)** | | | **4,844** |
| **Profitability index (IP)** | | | **1.02** |
| **Internal rate of return (IRR)** | | | **7.28%** |

*Source:* Authors' calculation

All presented results indicate that the company can consider both investments economically justified. However, higher values of examined indicators favor the investment in 10 ha of arable land and corn cultivation.

*Table 16* presents the results of the sensitivity analysis. It is performed because of the instability of the markets from the beginning of 2022. Obtained results show that investment in 10 ha of land, and corn cultivation should be implemented because this investment is acceptable according to all considered cases. However, this investment was more sensitive in case of a decrease in selling price or a decrease in the yield of 5 percent. The investment was less sensitive to an increase in both material, and immaterial costs. Based on the sensitivity analysis, the first scenario is acceptable in all three parameters of investment efficiency.

**Table 16.** The sensitivity analysis

| Scenario 1 | | | | |
|---|---|---|---|---|
| **Parameter** | **Change in parameter (%)** | **Net present value (EUR)** | **Profitability index** | **Internal rate of return (%)** |
| **Base value** | **0** | **15,858** | **1.07** | **7.99** |
| Selling price | +5 | 26,050 | 1.12 | 8.67 |
| Selling price | -5 | 5,666 | 1.03 | 7.32 |
| Yields | +5 | 26,050 | 1.12 | 8.67 |
| Yields | -5 | 5,666 | 1.12 | 7.32 |
| Material costs | +5 | 13,146 | 1.06 | 7.82 |
| Material costs | +10 | 10,433 | 1.05 | 7.64 |
| Total costs (mat.+ imm.) | +5 | 11,575 | 1.05 | 7.71 |
| Total costs (mat.+ imm.) +5 | +10 | 7,291 | 1.03 | 7.43 |
| **Scenario 2** | | | | |
| **Parameter** | **Change in parameter (%)** | **Net present value (EUR)** | **Profitability index** | **Internal rate of return (%)** |
| **Base value** | **0** | **4,844** | **1.02** | **7.28** |
| Selling price | +5 | 12,856 | 1.06 | 7.82 |
| Selling price | -5 | -3,168 | 0.98 | 6.73 |
| Yields | +5 | 12,856 | 1.06 | 7.82 |
| Yields | -5 | -3,168 | 0.98 | 6.73 |
| Material costs | +5 | 3,669 | 1.02 | 7.20 |
| Material costs | +10 | 2,493 | 1.01 | 7.12 |
| Total costs (mat.+ imm.) | +5 | 2,077 | 1.01 | 7.09 |
| Total costs (mat.+ imm.) | +10 | -691 | 1.00 | 6.90 |

*Source:* Authors' calculation

On the other hand, investment in 10 ha of land, and cultivation of soybean was more sensitive to changes in business conditions, due to lower profitability. Obtained results indicate that the second scenario should be implemented in all examined cases except in the case of a decrease in the selling price or decrease in the yield of soybean that

amounts to 5 percent. Also, in case of an increase in material, and immaterial costs (without interest) of 10 percent, the second scenario shouldn't be accepted according to the sensitivity analysis.

## Discussion

Based on the results of the analysis of two potential investment alternatives, the authors can emphasize the following points:

- The first scenario - investment in 10 ha of land and cultivation of corn gives a positive net present value that amounts to 15,858 EUR, based on the economic life of the project of 10 years, and the discount rate of 6.95 percent. The second scenario - investment in 10 ha and cultivation of soybean, also indicates a positive, but lower net present value that amounts to 4,844 EUR, based on the economic life of the project of 10 years, and the discount rate of 6.95 percent. Since the net present value of both investments is higher than zero, the potential investments should be accepted. However, the first scenario investment is preferable, since the first scenario has a higher net present value than the second one.
- According to the first scenario, given the project's economic life of 10 years, and the discount rate of 6.95 percent, the profitability index is 1.07, which indicates that each EUR of the present value of investment results in 1.07 EUR of the present value of net inflows. Given the project's economic life of 10 years, and the discount rate of 6.95 percent, the second scenario has a profitability index value of 1.02, which indicates that each EUR of the present value of investment results in 1.02 EUR of the present value of net inflows. Both investments have profitability ratios higher than one, and thus, they should be accepted. However, the first alternative is more attractive than the second one, because it has a higher value of the profitability index.
- The first possibility has an internal rate of return that amounts to 7.99 percent, while the second investment has an internal rate of return of 7.29 percent. Internal rates of return of both scenarios are above the weighted average cost of capital 6.95 percent, and therefore according to this method, two projects should be accepted. The first scenario has higher profitability compared to the second one since it has a higher level of internal rate of return.
- The results of sensitivity analysis and changes of input parameters indicate that the first scenario is more acceptable in all three parameters of investment efficiency.
- All results indicate that the investigated company can consider both investments economically justified. However, higher values of examined indicators favor the investment in 10 ha of arable land and corn cultivation.

Presented results of dynamic efficiency analysis of two alternative investments are useful to the management of company X in the area of Stara Pazova in order to increase production scale and companies profitability. Also, this methodology and research example is significant to a broad range of agricultural manufacturers, investors, and

researchers interested in this area. This research could lead to new analyses of investment efficiency evaluation in agricultural production of different crops or implementation of new technology. Obtained results are in line with the results of Njegić et al., (2011), which showed that the investment in soybean cultivation (without investment in land) has a positive net inflows of the economic flow in all years of the project except in the year of implementation of the investment with positive net present value, profitability index above one, and internal rate of return above the cost of capital. Also, obtained results for two assessed scenarios are similar to the Влаовић Беговић et al., (2018) that considered the acceptability of investment in agricultural land, and production of a combination of several crops with the conclusion that the project is acceptable (according to net present value, profitability index, and internal rate of return) and contributes to the increase of enterprise value.

## Conclusions

The dynamic efficiency analysis and evaluation of an investment in 10 ha of arable land, and cultivation of corn (scenario 1) or soybean (scenario 2) were performed based on the data collected by interview with the management of the company "X" and internet sources. The assessment of the acceptability of two proposed scenarios was performed using the dynamic capital budgeting methods (net present value, profitability index, and internal rate of return), as well as sensitivity analysis, which is appropriate in conditions of uncertainty.

Results of the analysis showed that investing in both observed scenarios is economically profitable and sound. However, dynamic capital budgeting methods gave advantage to the first scenario, that is, investment into 10 ha of land, and cultivation of corn. Also, sensitivity analysis showed that the corn production is less sensitive to changes and acceptable in all considered cases.

This analysis can be extended to the assessment of investment in land, and cultivation of some other types of crops, as well as in purchasing of agricultural mechanization or implementing new generation technology ("smart agriculture"). This research and efficiency evaluation example is useful to a broad range of agricultural companies, individual households, investors, and researchers.

## Acknowledgements

This paper is a part of project research "Economic efficiency assessment of investments in agricultural production of corn and soybean" conducted for the private enterprise X.

## Conflict of interest

The authors declare no conflict of interest.

## References


1. Andres, P., Fuente, G., & San Martin, P. (2015). Capital budgeting practices in Spain. *Business Research Quarterly*, 18(1), 37-56.
2. Baruwa, I.O., & Fabode, O.A., (2019). Uporedna investiciona analiza za male proizvođače brojlera i jaja u državi Osun, Nigerija. *Journal of Agricultural Sciences*, 64(3), 279-291.
3. CFA Institute, (2020). *Corporate Finance and Equity*. Level I, Volume 4. New Jersey: Wiley Global Finance.
4. Correia, C. (2012). Capital budgeting practices in South Africa: A review. *South African Journal of Economics and Management.*
5. Damodaran, A. (2005). *Korporativne finansije: Teorija i praksa.* Modus, Podgorica. [*in English*: Damodaran, A. (2005). *Corporate finance: Theory and practice*. Modus, Podgorica].
6. Damodaran, A. (2015). *Applied Corporate Finance (4th Ed.).* Hoboken, NJ: John Wiley & Sons Inc.
7. Damodaran, A., (2022). The equity risk premium for the German market; Unlevered beta for emerging markets for agriculture, (available at: https://pages.stern.nyu.edu/~adamodar/).
8. Dašić, D., Stanić, T., & Živković, D. (2022). Market of Agricultural and Food Products in the Republic of Serbia: Possibilities and Implications. *Economics of Agriculture*, 69(1), 57-74, DOI: 10.5937/ekoPolj2201057D.
9. Dedi, L., & Orsag, S., (2007). Capital budgeting practices: A survey of Croatian firms. *South East European Journal of Economics and Business*, 2(1), 59-67.
10. Ercegovac, D., & Živkov D. (2018). Competitiveness of the Serbian economy, FDI and balance of trade deficit problem. *International Scientific and Expert Conference Economic Development and Competitiveness of European Countries,* Novi Sad School of Business, Novi Sad, October, 49-51.
11. Graham, J.R., & Harvey, C.R. (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics*, 60(2-3), 187-243.
12. Kuzman, B., Djuric, K., Mitrović, Lj., & Prodanovic, R. (2017). Agricultural Budget and Agriculture Development in Republic of Serbia. *Economics of Agriculture,* 64(2), 515-531.
13. Lopes Santos, D.F., de Morales Farinelli, J.B., Horita, K., da Silva, B.L., & Fonseca Souza, C.A. (2020). Investment analysis of soybean production system in sugarcrane renewal areas. *Custos e @gronegocio on line*, 16(3), 130-164.
14. Marković, M., Krstić, B., & Popović, S. (2022). Competitiveness of Agri-Food Exports of the Republic of Serbia in the Covid-19 Conditions. *Economics of Agriculture*, 69(1), 227-239, DOI: 10.5937/ekoPolj2201227M.
15. Mihailović, B., Cvijanović, D., & Kuzman, B. (2014). *Challenges of Management Consulting in Modern Business of Agricultural Enterprise*, (Monograph), Institute of Agricultural Economics, Belgrade.

16. Момчиловић, М, & Ерцеговац, Д. (2022). Анализа, моделирање и мерење ризика инвестиционих пројеката у Републици Србији, *Научно-стручна конференција „ЕУ за младе – изазови и могућности“,* Висока пословна школа струковних студија, Нови Сад, мај, 35. [*in English*: Momčilović, M. & Ercegovac, D. (2022). Analysis, modeling and measuring of investment projects risks in the Republic of Serba, *Scientific conference „EU for jouth – chalanges and possibilities“,* Novi Sad School of Business, Novi Sad, May, 35].
17. Novković, N., Vukelić, N., Mutavdžić, B., Lukač-Bulatović, M., & Milošević, M. (2017). Ekonomski efekti investiranja u zasad lešnika. *Agroekonomika*, 46(74), 21-29.
18. NS COMEX – Produktna berza ad Novi Sad, (2022). Prices and yields of corn and soybean, (available at: https://nscomex.com).
19. Njegić, J., Momčilović, M., & Berber, N. (2011). The Advantages of Investing in Organic Compared to Conventional Agricultural Production, *4th International Conference for Enterpreneurship, Innovation and Regional Development – ICEIRD*, Ohrid, 1277-1284.
20. Pantić, N., Mikulič, K., & Lekovič, M. (2022). The influence of claims payments on the investment portfolio of insurance companies. *Oditor*, *8*(3), 42-71. https://doi.org/10.5937/Oditor2203042P
21. Pavlović, M. M., Popović, J., & Turnjanin, D. (2021). Development of small and medium enterprises in Serbia. *Oditor, 7*(2), 47-64. https://doi.org/10.5937/Oditor2102047P
22. Peterson, P.P., & Fabozzi, F. J. (2002). *Capital Budgeting: Theory and Practice*. New York: John Wiley & Sons.
23. Radić, V., Radić, N., & Cogoljević, V. (2022). New Technologies as a Driver of Change in the Agricultural Sector. *Economics of Agriculture,* 69(1), 147-162, DOI: 10.5937/ekoPolj2201147R.
24. Stančić, P., & Čupić, M. (2020). *Korporativne finansije*. Ekonomski fakultet Kragujevac. [*in English*: Stančić, P., & Čupić, M. (2020). *Corporate finance*. Faculty of Economics Kragujevac].
25. Statista, (2022). Inflation in EU,(available at: https://statista.com/statistics/37520).
26. Subić, J. (2017). Assessment of Investments by the Use of Software Application for Development of the Business Plan in Agriculture. *Ekonomika, 63*(2), 1-14, DOI: 10.5937/ekonomika1702001S.
27. Subić, J., Kljajić, N., & Jeločnik, M. (2017). Renewable Energy Use in Raspberry Production. *Economics of Agriculture, 64*(2), 821-843.
28. Tešić, R., Mihajlović, M., Jeremić, D., & Ilić, Đ. (2021). Strategija diverzifikacije kao nužnost opstanka, rasta i razvoja proizvodnih preduzeća, *Akcionarstvo, 27*(1), 27-39.
29. Todorovic, M., Kalicanin, Dj., & Nojkovic, A. (2015). Practices of Performance Measurement in Companies in the Republic Of Serbia. *Economic Horizons, 17*(1), 45-58, DOI: 10.5937/ekonhor1501045T.

30. Todorović, M., & Ivanišević, M. (2018). *Poslovne finansije.* Beograd: Centar za izdavačku delatnost Ekonomskog fakulteta u Beogradu.
31. Trading Economics, (2022). Yield on the German 10-year government-owned bond, (available at: https://tradingeconomics.com/germany/government-bond-yield).
32. Влаовић Беговић, С., Момчиловић, М., & Томашевић, С. (2018). Оцена економске ефикасности инвестиција. *Анали Економског факултета у Суботици*, 54(39), 187-204. [*in English*: Vlaović Begović, S., Momčilović, M., & Tomašević, S. (2018). Economic efficiency assessment of investment. *Annals of Economic faculty in Subotica*, 54(39), 187-204].