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Bojan Savić
University of Belgrade
Faculty of Agriculture
Institute of Agricultural Economics

Zorica Vasiljević
University of Belgrade
Faculty of Agriculture
Institute of Agricultural Economics

Ivan Milojević
Ministry of Defence, Human Resources
Sector – Department of Finance, Belgrade

COSTING SYSTEM AS AN INSTRUMENT FOR ENHANCING ENVIRONMENTAL PERFORMANCE OF ENTITIES IN AGRIBUSINESS

Obračun troškova kao instrument unapređenja ekoloških performansi entiteta u agrobiznisu

Abstract

Acquiring and preserving competitive advantage requires companies to closely monitor and analyze their business costs and take timely corrective actions. The fact that business sustainability requires the consideration of not only economic aspects, but also the social and environmental dimensions of business, has created the need in cost management to understand the implications of business operations for the broader environment of entities. The greatest number of modern techniques and methods of cost calculation and analysis put primary focus on the costs that arise from the production phase. From the perspective of global competition, taking into consideration the imperative of maintaining sustainable business in the long run, the obtained information is not sufficient for the needs of designing, implementing and revising competitive strategies. This is particularly significant for entities operating in the fields of agriculture and agribusiness, whose activities, as it is well known, have a significant impact on the environment and its degradation. The aim of the paper is to point out the importance of creating cost accounting information that goes beyond the traditionally understood operating costs in order to quantitatively encompass and give a monetary presentation of environmental business aspects, which are very important in a modern business environment for capturing, analyzing, managing and improving the overall performance of an entity. For those purposes, the paper considers true cost accounting and points to the specificity of its application in agribusiness entities.

Keywords: *true cost accounting, environmental management accounting, environmental performance, sustainability, agribusiness sector.*

Sažetak

Sticanje i očuvanje konkurentske prednosti zahteva od preduzeća da pažljivo prate i analiziraju troškove svog poslovanja i blagovremeno preduzimaju korektivne akcije. Okolnost da održivost poslovanja zahteva respektovanje ne samo ekonomskih aspekata, već i socijalnu i ekološku dimenziju poslovanja, iznedrila je potrebu da se u naporima upravljanja troškovima sagledaju implikacije poslovanja na šire okruženje entiteta. Najveći broj savremenih tehnika i metoda obračuna i analize troškova primarni fokus stavljaju na troškove koji nastaju u fazi proizvodnje. Iz perspektive globalne konkurencije i imperativa održivog poslovanja u dugom roku, dobijene informacije nisu dovoljne za potrebe koncipiranja, implementacije i revizije konkurentskih strategija. Ovo je posebno značajno u domenu poslovanja entiteta iz poljoprivrede i agrobiznisa čije aktivnosti, kao što je poznato, imaju značajan uticaj na životnu sredinu i njeno degradiranje. Cilj rada je da ukaže na značaj kreiranja informacija od strane računovodstva troškova koji izlaze izvan okvira tradicionalno shvaćenih troškova poslovanja. Ovo iz razloga kako bi se kvantitativno obuhvatili i monetarno iskazali ekološki aspekti poslovanja, koji u savremenom poslovnom ambijentu imaju izuzetan značaj za potrebe obuhvatanja, analize, upravljanja i unapređenja sveukupnih performansi entiteta. Za navedene potrebe u radu se razmatra „true cost accounting" i ukazuje na specifičnosti primene navedenog koncepta u entitetima u agrobiznisu.

Ključne reči: *true cost accounting, ekološko upravljačko računovodstvo, ekološke performanse, održivost, agrobiznis sektor.*

Introduction

One of the central issues concerning sustainability of modern companies is the issue of environmental implications, i.e. the impact of their activities and products on the environment. Since agriculture and the associated processing industry are seen as one of the main culprits for environmental degradation and the intensification of climate changes, companies in the agricultural and agribusiness sectors have to place a special emphasis on environmental management in their agendas. This is because the business of these entities both directly and indirectly affects the quality of land, water and air. Irrational and irresponsible use of numerous chemicals, such as fertilizers, herbicides and insecticides, the application of which is an integral part of the agricultural production process, as well as greenhouse gas emissions, significantly reduce the quality of land and water resources. That is why it is fully justified to pose the question whether it is possible to ensure unhindered satisfaction of the growing needs of human population in the near future.

The cited negative environmental implications of agricultural activity and related processing industries have economic consequences that are covered by and monitored through numerous environmental indicators and costs. When it comes to costs, it is a category which is not always easy to notice and which has been growing in recent years due to increasingly rigid environmental laws and regulations. In addition, it should be added the activities and campaigns of numerous non-governmental organizations and environmental movements, why all producers aiming at sustainable and competitive business pay considerable attention to the environmental dimension of their business.This is not only because of the significant economic implications for the entity itself, but also because of the imperatives of preserving the environment and achieving the goal of sustainable development of society [34, p. 25].

The aim of this paper is to point out the contemporary costing systems whose implementation can contribute to the improvement of the environmental dimension of the company. In this regard, the paper describes the specifics of true cost accounting whose key feature is that it encompasses environmental costs that traditional cost accounting systems do not recognize.

Environmental management accounting

Companies have a significant impact on the economy and society as a whole, which suggests that sustainable development of society is not possible without sustainable development of companies. The company's contribution to the goal of sustainable development presupposes the existence of adequate information as the starting point for the development of competitive strategies. If such information does not exist, the activities of the company will not be in accordance with the stated objective. Hence, it is necessary to accept and implement the concept of environmental management accounting whose techniques enable the creation of necessary information and the performance of activities based on them, which will not only improve the environmental performance of the company, but also contribute to its sustainable development. Companies disclose environmental information to signal that they detected environmental disturbances [4, p. 347]. The information on environmental performance will not be useful for strategic plans and decisions unless they are closely related to corporate sustainability. This is because corporate sustainability implies not only the sustainable development of a single company, but also its contribution to the sustainable development of the economy and society as a whole [35, p. 114].

Environmental management accounting (EMA) includes internal costs arising from the impact of company's products, services and activities on the environment, i.e. costs borne by the enterprise and included as such in the cost accounting system. External costs that have not acquired internal character are not considered. It is the responsibility of the state and its agencies to integrate these costs into corporate accounts through instruments such as environmental taxes and pollution control. However, the importance of perceiving external environmental costs is enshrined in the fact that they can acquire internal character within a short period of time by means of a specific regulation. In that sense, the management should understand the environmental implications of certain

decisions and actions in order to choose alternatives that create value both for the environment, through the reduction of pollution and reparation of damage incurred, and for the enterprise. According to the IFAC guidelines, environmental management accounting includes [12, p. 17]:

1. Eco-efficiency – reflects the achieved cost savings and their associated contribution to resolving environmental issues;
2. Strategic position – points to the way in which the enterprise incorporates environmental program into its long-term plans and business strategy;
3. Efficiency of compliance with corporate and environmental regulations.

EMA generates information on environmental performance and measures the costs of using resources and associated waste, as well as other environmental costs. It also encompasses and quantitates the amounts of resources and waste, expressing them in units of measurement. As such, EMA can occur in two forms. One of them is monetary environmental management accounting – MEMA, which considers and encompasses the environmental aspects of corporate activities expressed in monetary units and generates information for management purposes, such as deciding to invest in capital projects that improve the environment, cost management, etc. Additionally, MEMA is based on conventional management accounting that has been expanded and adapted to incorporate environmental aspects of corporate activity. For proper cost evaluation, in addition to financial information, management accounting must also collect and process nonfinancial information, such as the type and amount of materials used, the number of labor hours and other costs incurred. Another form of MEMA is used for physical environmental management accounting – PEMA. PEMA is especially focused on the information on the use of energy, water and materials, as well as generated waste and emissions that have a direct impact on the environment [20, pp. 20-21].

According to Bennett et al., the value of environmental management accounting can be recognized in at least three areas [4, pp. 20-21]:

- by directing management's attention to issues in the area of efficiency and effectiveness of environmental management, which contributes to higher quality of decisions;
- external value exists in terms of reducing the impact of business on the external environment as a result of better decisions and increased efficiency, and
- environmental management accounting supports the integration of monetary and physical information about the environment and incorporates them into the decision-making process. In this way, the management takes into account environmental issues that are economically crucial and, accordingly, creates an environmental management program.

Indicators of environmental performance and environmental costs

Environmental performance reflects the impact of activities, processes, use of materials and energy and products of an enterprise on the nearest environment, i.e. natural capital. There is a wide range of indicators related to the environmental dimension of sustainable development, and the practice has so far shown that, from the management perspective, greater significance has been given to physical than to monetary information.

Different bodies that treat these issues recommend different standards, and below will be shown environmental standards which are part of the Global Reporting Initiative Standards (effective from July 1, 2018).The aim of these standards is to provide guidelines for the preparation of information indicating the impact of the enterprise on the nearest environment, including soil, water, air and ecosystem. In this regard, when reporting, enterprises need to respect a number of standards, some of which are the following [17]:

- *GRI 301 - Materials* refers to the information on the material (type and quantity) that has been used for the production and packaging of products and the provision of services, both from nonrenewable resources, such as minerals, metals, oil, gas, and renewable ones, such as wood, water, etc. The company should disclose whether recycled or new materials have been used, as well as the impact of their use on the environment;

- *GRI 302 - Energy* refers to the energy used inside and outside the enterprise, used energy sources (renewable and nonrenewable), intensity of use, measures taken to reduce energy consumption. Efficient use of energy and commitment to renewable energy sources support efforts to improve environmental performance;
- *GRI 303 - Water and Effluents* covers the issue of use of water resources by the observed enterprise, as well as the wastewater resulting therefrom. The enterprise should devote efforts to achieving sustainable water management, as well as remedying the damage incurred;
- *GRI 304 - Biodiversity* entails reporting on efforts aiming at the preservation of biodiversity, i.e. plant and animal species, genetic diversity and natural ecosystems. At the same time, this ensures food safety and improves both the health and welfare of population;
- *GRI 305 - Emissions* refers to direct and indirect air emissions (greenhouse gas, ozone-depleting substance, nitrogen oxides, sulfur oxides). Disclosure is important because of adverse impacts on the climate, ecosystem, natural habitats, air quality, agriculture, human and animal health. The enterprise should indicate incurred emissions and efforts towards their reduction and repair of the damage caused;
- *GRI 306 - Effluents and Waste* refers to the handling and disposal of waste, the discharge of chemicals, petroleum and other materials, contaminated sites, the extent and type of pollution generated;
- *GRI 307 - Environmental Compliance* covers the organization's compliance with environmental laws and regulations (international declarations, conventions and treaties, as well as national, subnational, regional, and local regulations);
- *GRI 308 - Supplier Environmental Assessment* refers to the fact that an organization might be exerting impact either through its own activities or as a result of its business relationships with other parties. This implies that the company needs to prevent and mitigate negative environmental impacts within the supply chain.

When selecting key indicators of environmental business aspects, the enterprise starts from the indicators that are relevant to the target group of stakeholders, as well as to the needs of environmental risk management and improvement of environmental performance. Rodrigue et al. (2013) found that a firm's environmental strategy is aligned with its set of environmental performance indicators [31, p. 313]. According to Thomas (2015), integration of sustainability metrics into core processes helps the company to identify opportunities for improved allocation of resources, as well as for waste elimination and efficiency [36].

In a traditional sense, the management of an enterprise faces the economic challenge of maximizing returns on engaged resources. Analogously, the challenge of sustainable management is to achieve optimal environmental and economic performances at the same time. Observing these aspects led to the emergence of combined indicators that address these two dimensions. Eco-effectiveness (ecological effectiveness) refers to the extent of success in reducing company's impacts on the environment. This indicator is expressed in terms of absolute amounts of CO2 emissions, ecological footprints, and total mass of materials or energy. Eco-efficiency is defined as the relation between economic (monetary) criteria and physical (ecological) criteria. In other words, this indicator shows additional environmental impact per unit of created value [5, p. 7]. Fige and Hahn (2013) showed that companies needed to use economic and environmental capital more efficiently in order to gain competitive advantage [16, p. 174].

In order to "achieve more with less" or to create the current level of value by engaging a smaller amount of resources or greater value with an unchanged amount of engaged resources [13, p. 3], an important aspect of eco-efficiency is the productivity of engaged resources. It is interesting that the Division for Sustainable Development Goals of the United Nations has also considered inefficient use of materials and energy to be ecological costs. In order to achieve eco-efficiency, efforts are being made to avoid wastage of resources, generating as little waste and emissions as possible.

When it comes to environmental costs at the level of enterprise, these are the costs arising from the activities

undertaken to prevent and reduce the negative effects, as well as eliminate the resulting environmental damage, caused by the processes and products of the enterprise. Precisely due to the fact that environmental and economic performances are closely related and that environmental costs, which in recent years have shown a growing trend, have a direct impact on the level of profit and, thus, on other economic indicators, it is first necessary to identify ecological costs in the total corpus of costs in an enterprise and point out the types of costs that can occur in this category. This is particularly important, first of all, for the management of the enterprise which not only manages the costs, but also defines certain strategies towards achieving sustainable development of the enterprise. There is no uniform classification of environmental costs in literature. Some authors, as well as various regulatory bodies from the domain of environmental management, provided various categorizations of these costs, and below will be shown a rather comprehensive cost classification defined by Hansen et al. [19, p. 512]:

- costs of prevention (selection of environmentally aware suppliers, installation of equipment, adjustment of product design and change of production technology, recycling of products, costs of ISO 14001 certification);
- costs of detection (inspection of products and processes, development of systems for measuring environmental performances, laboratory analysis, measurement of contamination level);
- internal costs of environmental failures (costs of operation and maintenance of equipment for pollution control, treatment and disposal of toxic waste, spoilage that remains after recycling);
- external costs of environmental failures (cleaning of contaminated soil and water, compensation for environmental injuries caused by ecological excesses of the enterprise, loss of customers due to unfavorable environmental performances).

On the basis of the above-cited classification, it is possible to see the correlation between certain categories of environmental costs. Thus, for example, higher costs of prevention will result in avoidance and reduction of costs of internal and external gaps and vice versa, the costs of remedying the resulting consequences of environmental damage would be even higher if the management of the enterprise was not proactive and ignored the importance of prevention of ecological risks. Additionally, based on the size of certain categories of environmental costs, many stakeholders can gain insight into ecological awareness and the importance that the management of the enterprise attaches to the ecological dimension of business. The research shows that the pressure by stakeholders significantly affects the green operation practices, which in turn leads to improvement of environmental performance [38, p. 6403].

Some types of environmental costs have already been covered and analyzed by accountants and the management, e.g. waste disposal and waste management costs, the costs of installing and operating control systems that reduce emissions to water and air, waste water treatment, etc. On the other hand, there are costs that are still invisible to the accounting profession, such as external costs that arise in the long run, followed by the costs arising from disposal of waste to the local community, pollution of drinking water sources and air by legal emissions, after-sales costs, occurring when the product is in the customer's possession due to the disposal of unwanted packaging, the distortion of reputation of the pollutant enterprise in business circles and the local community, potential costs and the like [22, p. 813]. In other words, it is necessary to invest in recycling, reusing and other waste management activities [37, p. 15]. Hence, it is imperative for the management to be aware of various forms of environmental costs. By identifying, analyzing and reducing them, the enterprise can achieve significant savings that can be used for investments in more productive purposes, such as technology that will contribute to cleaner production and other innovative ventures [8]. The corporate social responsibility performance is correlated with financial performance [24, p. 56]. According to Lisi (2015), improvement of environmental performance contributes to the corporate economic well-being [23, p. 41].

Managing environmental costs and covering them by accounting are important not only for the purpose of planning, controlling and undertaking corrective actions and making other efforts to avoid the escalation of environmental risks and ensure competitive and sustainable operations of the enterprise, but also in order

to support the global goal of sustainable development of the society as a whole. Moreover, Martin and Moser (2016) point out that potential investors respond positively to green investments and companies' disclosures of social benefits of such investments [26, p. 239].

Environment-oriented costing systems

Traditional costing systems do not recognize environmental costs as a separate category, but generally include them in overhead costs. In addition, one part of these costs remains completely invisible, which is why the management does not have an accurate insight into the actual costs of individual products and therefore into the total costs of doing business. Also, the calculated unit costs of a product do not represent a reliable basis for defining the policy of selling prices, calculating the results, or making business decisions. With the clear tendency of growing importance of environmental issues, which consequently lead to an increase in the share of ecological costs in total costs, there was a need for more accurate information not only about the costs incurred, but also about the potential costs and savings and additional sources of revenue based on the ecological aspects of business. This information represents necessary support for the cost-benefit analysis, budgeting, product design corrections, decisions on the use of alternative materials, changes in business processes and other business, investment and financial decisions. Additionally, an environmental cost-benefit analysis ..."can support participative environmental planning by fostering stakeholder dialogue and increasing acceptance through increasing transparency in the decision-making process" [9, p. 294].

Eco-efficiency indicators arise from contemporary cost accounting approaches [28, p. 889]. In practice, a number of costing methods focused on encompassing environmental costs have been developed, and the method for calculating environmental costs, which is relatively recent, is considered to be comprehensive and suitable for use in all manufacturing enterprises, including those from the field of agriculture and agribusiness.

True cost accounting (TCA) is a method that includes all fixed and variable costs necessary to produce and distribute a product unit. Observed in the context of business sustainability and environmental challenges, the framework of this method, compared to traditional cost accounting approaches, has been expanded to include goods that cannot be acquired on the market, such as environmental assets [6]. What also differentiates TCA from other methods is the inclusion of both internal and external influences that the company exerts through its operations and realized output, as well as provision of more precise information for decision-making [29, p. 200].

According to IFAC, external environmental costs include depletion of natural resources, noise, residual air and water emissions, long-term waste disposal, uncompensated health effects, change in local quality of life [20, p. 36]. In other words, the concept of natural capital is respected when covering and analyzing costs. TCA recognizes four tiers of costs: Tier 0 – direct costs only; Tier 1 – Tier 0 plus indirect costs (overheads); Tier 2 – Tiers 0 and 1 plus legal liability costs; and Tier 3 – Tiers 0 through 2 plus intangible costs and benefits [25, p. 189].

The specificity of TCA is reflected in the attempt to express the costs of environmental services in monetary units. This will allow that the environmental key performance indicators should be viewed in a cause-and-effect relationship with realized financial performances. Additionally, TCA envisages observing environmental impacts and related costs not only at the level of individual enterprises, but also at the level of the entire supply chain [27, p. 18].

From the perspective of agricultural and agribusiness entities, particularly interesting are the external influences manifested through contamination of watercourses and soil, as well as the GHG emissions into the atmosphere, all of which have a feedback effect not only on the crops and sustainability of production in the associated processing industry, but also on the entire living world. According to a study conducted by the FAO in 2012, the amount of external costs incurred on the basis of global production of maize, wheat and soybean is 1.7 times higher than the value of achieved production [32]. Also, the research shows that environmental costs comprise 30-50% of the farmgate price [33]. This led to the idea that polluters should bear the costs of impact of their business on the ecosystem, above all the costs arising from the influence that they can

control. Expressing environmental impacts of farming in monetary units allows stakeholders to see and evaluate the real costs of production [10, p. 597]. Annaert et al. (2017) show that the farm-specific practices have a key impact on the total sum of environmental costs [1, p. 527]. Companies strive to leave the impression on stakeholders that they operate in a sustainable way [11, p. 355].

The key steps in applying TCA include: defining the cost objective (a particular product, process, whole or part of the business, all activities in an entity), specifying the scope of the analysis (entity or supply chain), identifying and measuring impacts and costing the external impact. Certainly, the biggest challenge in applying TCA is identifying and quantifying external influences [3, p. 63].

Since environmental costs increase total business costs, which is most often reflected in the level of sales prices, in accordance with the basic economic principle – efficient use of limited resources, the buyers of a specific product will be encouraged to opt for producers who have adopted the cleaner production concept, i.e. whose business activities reduce the impact on the immediate surroundings. Thanks to lower environmental costs, they will be able to offer products at competitive prices. In order for the external costs incurred by the business activity of an enterprise to be fully covered, it is necessary to consider this issue through the prism of the life cycle, since it is necessary to include the costs of subsequent activities preconditioned by the creation of primary activities. The goal is to identify the materials and energy which impact the environment. For example, in addition to the costs of procuring fertilizers and pesticides, it is necessary to include external costs of production, transport and application of these agents [2, p. 15].

The life cycle analysis monitors environmental impacts at the level of a single product or process upstream and downstream the supply chain. This enables determining the precise location in the supply chain from which an environmental impact has arisen. In this respect, TCA is viewed in literature as a financially significant life cycle analysis [3, p. 61].

In practice, the estimation of the amount of external costs is accompanied by a number of challenges that reflect on the objectivity of established values – costs that will arise in the future as the consequence of the impact. Some costs are incurred outside the reach of the enterprise, which is why it is difficult to express them in monetary units [18, p. 576]. Hence, some authors choose to include only the influences that arise from the enterprise's processes and products that directly generate financial expenditures (costs of prevention and elimination of damage arising from compliance with the standards and legislation in the field of health care and ecology), suggesting that there should be not considered the potential costs that may beinitiated by the emergence of certain future events. This certainly reduces the scope of the displayed costs that the enterprise caused by its operations, but also ensures the objectivity of the included values [2, p. 35].

Total cost measurement is based on a top-down approach – it starts from the overall impact, i.e. environmental pollution caused by a particular enterprise or supply chain, and then the estimated amount is related to certain causes that are subject to monitoring (for example, the use of pesticides, fuel, water, transport, etc.). The abovementioned causes are further broken down to determine what gives rise to the highest level of emissions in order to control and take corrective actions [14, p. 51].

The costs that can be objectively assessed are the costs arising from practices that degrade the environment and consequently impair human health. Thus, for example, the costs of watercourse contamination are estimated at the level of expenditures incurred as the result of efforts to regain the quality of water which does not endanger the health of users. In other words, it does not include the costs of repairing damage done to watercourses that are not directly used for human consumption. The costs arising from the elimination of air emissions leading to the occurrence of climate changes which have an impact on health are subject to assessment and inclusion in total external costs. Furthermore, the costs of remediation of erosion and damage caused by soil contamination are also included, as well as the costs of strengthening biodiversity, restoring disturbed ecosystems and habitats and eliminating the damage caused by application of pesticides and nitrates harmful to human health [2, p. 38].

The advantage of TCA is in the fact that it does not require significant changes in the existing cost accounting

system of an entity. In addition, TCA provides the opportunity that environmental costs should be monitored by their drivers. Also, TCA encourages integrating the principles of sustainable development into the decision-making process. The key limitation of this method is that its application is rather complex and requires engagement of a number of experts who will evaluate the effects of an enterprise's impact on the environment and enable certain nonfinancial indicators to be expressed in monetary units. Proper implementation of TCA provides significant potential for improvement of the enterprise's environmental performance [27, p. 13]. It is also necessary to point out that the environmental impact of entities from the domain of agriculture and agribusiness depends to a considerable extent on the adopted and implemented agrarian and environmental policies in a country or region. Namely, the quality of water, air and soil, climate change management, conservation of natural habitats and biodiversity, all rely on the activities of enterprises that depend on the incentives and sanctions that the relevant legislation foresees [30, p. 26]. Finally, viable business assumes environmentally acceptable practices not only at the level of the enterprise, but also at the level of the entire supply chain [15, p. 812].

Conclusion

The issues of corporate and social sustainable development and related environmental performance management in modern business conditions have been put into strategic context, representing both an opportunity and a limitation for the operations of an enterprise. Bearing in mind that agriculture and agribusiness have significant implications for the environment, it is necessary that the management of enterprises in this sector pay special attention to the environmental performance and its impact on sustainability of business operations. The impact of environmental issues on business operations is manifested through imposition of increasingly rigorous standards and legal regulations, as well as through associated pressure from numerous stakeholders on the enterprise to improve its environmental performance. Hence, the strategies that respect the ecological dimension of business, reflected in the prevention and reduction of environmental damage, are a good way to improve the financial performance of an enterprise. Environmental management accounting and cost accounting systems that recognize the importance of environmental costs in total operating costs provide significant information support necessary for defining the strategies and ways of managing the ecological aspects of business. This paper discusses one of the contemporary costing concepts that attempt to capture external environmental costs, with particular reference to the specificity of its application in the field of agriculture and agribusiness. Its purpose is to create information that will enable the development of environmental and business strategies as an instrument for the accomplishment of the overall objective of corporate and social sustainable development.

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Bojan Savić

is Assistant Professor at the Faculty of Agriculture, University of Belgrade. He also teaches at the Military Academy, University of Defence. He teaches the following courses within undergraduate, master's and PhD studies: Financial Analysis, Principles of Finance, Principles of Financial Management, Cost Accounting, Cost Management, Special Purpose Financial Statements, Financial Reporting and Auditing. His research focuses on financial reporting, environmental management accounting, sustainability and corporate finance.

Zorica Vasiljević

is Full Professor at the Faculty of Agriculture, University of Belgrade. She also teaches at the Military Academy, University of Defence. She teaches the following courses within undergraduate, master's and PhD studies: Theory of Cost with Calculations, Principles of Finance, Principles of Financial Management, Risk and Insurance in Agriculture, Financing of the Business Systems in Agrarian Economy. Her research focuses on the economics of investment in agribusiness, financing of agriculture, insurance in agriculture.

Ivan Milojević

is Senior Research Associate at the Ministry of Defence of the Republic of Serbia. He also teaches the following courses within master's and PhD studies at the Military Academy: Accounting Information Systems, Tax and Budget Control and Audit, State Audit, Financial Reporting of Budget Users, Accounting System and Tax Balance. His research focuses on macroeconomic and public finance sector, accounting and audit information systems.