ČASOPIS ZA POSLOVNU EKONOMIJU, PREDUZETNIŠTVO I FINANSIJE
MAGAZINE FOR BUSINESS ECONOMICS, ENTREPRENEURSHIP AND FINANCE

POSLOVNA EKONOMIJA - BUSINESS ECONOMICS

EDUCONS UNIVERZITET

UNIVERZITET EDUKONS,
FAKULTET POSLOVNE EKONOMIJE
Novi Sad, Sremska Kamenica
Vojvode Putnika 87

Tel: 021/489-3647, 021/489-3611
www.educons.edu.rs

ISSN 1820-6859
9 771820 685005

God. XIX - br. 2/2025

POSLOVNA EKONOMIJA - BUSINESS ECONOMICS

UDK 3:33 + 336

EDUCONS UNIVERZITET

ISSN 1820 - 6859

POSLOVNA EKONOMIJA

Business economics

God. XIX - br. 2/2025

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POSLOVNA EKONOMIJA
BUSINESS ECONOMICS

Godina XIX, broj 2

vol. XXXII

Novi Sad, 2025.

UDK: 3:33 + 336 ISSN 1820-6859

POSLOVNA EKONOMIJA
BUSINESS ECONOMICS

ČASOPIS ZA POSLOVNU EKONOMIJU, PREDUZETNIŠTVO I FINANSIJE
MAGAZINE FOR BUSINESS ECONOMICS, ENTREPRENEURSHIP AND FINANCE
Godina XIX, broj 2
vol. XXXII

Časopis izlazi dva puta godišnje

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TAMPOGRAF, Novi Sad

Tiraž: 50 primeraka

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ISTRAŽIVANJA, OGLEDI I STUDIJE

UDK: 339.7(497.16)

Original Scientific Article

POSLOVNA EKONOMIJA
BUSINESS ECONOMICS
Godina XIX
Broj 2
Str: 1 – 17
DOI: 10.5937/poseko28-65329

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RAMIFICATIONS OF UNILATERAL DOLLARISATION FOR MACROECONOMIC POLICYMAKING: WHAT AWAITS MONTENEGRO?

ABSTRACT: Given somewhat unusual trajectory of Montenegro towards European monetary unification, we try to discern in this policy paper both obvious and less visible ramifications for Montenegrin macroeconomic affairs ahead of her integration agenda. Montenegrin economy's main challenges will be subpar industrial policy coupled with insufficient investment in knowledge cum innovation, abused fiscal domination and rising external imbalances, which would have to be addressed urgently by sustainable growth and development strategy, fiscal consolidation and public finance reform, as well as skilful real exchange rate management. If left unchecked, nominal wage dynamics, demographic trends and twin deficit crisis may soon burst her real-estate bubble and cause significant fall in living standard, whereas already elaborate real exchange rate appreciation might easily topple what's left of Montenegrin coastal tourism in the meanwhile.

Keywords: Dollarisation, Montenegro, Dutch disease, fiscal policy, twin deficits, two-sectoral model, real exchange rate

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"Dollarization is like wiring your mouth shut to lose weight.
It is effective in the short-run, but unless you undertake life-style changes
(eating habits, exercise)
you are not a healthier individual, just a thinner one..."
-C. Mann -
"Sibling relationships are always complicated, and, as these studies
indicate, so is the relationship between the twin deficits."
-Federal Reserve Bank of San Francisco-

INTRODUCTION

Presently, Montenegro is the most bureaucratically advanced among the Western Balkans candidate countries aspiring to join the European Union. This agenda, as is well-known, imposes a challenge of sustaining full-blown competition of the Single European market, which is a formidable task even for larger and better diversified economies that haven't given up on their own currencies, exchange rate and monetary policy, *i.e.* instruments potentially applicable to solving internal and external macroeconomic disequilibria inevitably met along the way. In addition, upon joining the EU, Montenegro nevertheless must fulfil some -probably abbreviated- convergence criteria (to qualify for the Eurozone).

However, the central rhetoric pertaining to what awaits Montenegrin economy on the chosen course is whether -thus far predominant- reliance on (coastal) tourism appears sustainable over the longer run? The answer is resounding no, for minimum[2] three reasons: 1) lazy overreliance on tourism has already exhibited *a la* Dutch disease symptoms in terms of sclerotic economic structure and import dependence with rather weak trickle-down backward linkages to local sourcing; 2) high sensitivity of tourism to exogenous shocks (global financial crises, pandemics, geopolitical conflicts of sorts, climate change); 3) regional inequality, depopulation of country's north and socio-political strife.

Hence, Montenegro is facing dire straits between imperatives of partial reindustrialisation, fiscal consolidation and improvement in her balance of payments. These solutions ought to be matched by at least three independent yet mutually attuned policy instruments in order to overcome the mounting macroeconomic challenges in a time-consistent fashion. This paper sketches a couple of likely theoretical hurdles under such circumstances that unilateral dollarisation adds to and/or amplifies on a top of regular workload for

[2] One may argue further that sheer width of Montengrin sea-coast is insufficient for economies of scale, while recent attempt (concious or otherwise) to move away from mass tourism in favour of exclusive packages and affluent customers has failed badly.

macroeconomic policymakers at the Montenegrin helm in the foreseeable future.

The rest of the paper is organised as follows: Section 2 offers a snapshot of Montenegro's macroeconomic constellation[3] in contrast to options and instruments at her disposal. Section 3 jots an outline of Montenegrin industrial policy and future-proof development strategy. Section 4 deals with counterfactual twin deficits crisis under fiscal dominance. Section 5 treats the real exchange rate arithmetic and its determinants in arriving to desired external balance, while section 6 concludes.

STYLIZED FACTS AND INSTRUMENTS AT DISPOSAL

Soon after introducing German marc as a legal tender in 1999, as an attempt to regain monetary sovereignty and distance itself from the former federation/state union, Montenegro has also unilaterally adopted the euro back in 2002, i.e. without a formal approval by the European Central Bank (ECB).[4] Consequently, unilateral dollarisation implies Montenegro's abdication from the ability to issue its own currency, in fact she cannot mint euro coins with local insignia either, and, more importantly, has no independent monetary policy (or input into ECB decisions) ever since. Montenegro additionally forgoes seigniorage (revenue from issuing own currency) and the function of a lender of last resort in a financial crisis, although it has access to some liquidity lines like the Eurosystem repo facility for central banks. Lastly, Montenegro lost nominal exchange rate as an instrument of external macroeconomic adjustment in a barter for less chance to be embroiled in a currency crisis.

When it comes to remaining policy instruments at country's disposal, apart from reserve requirements, The Central Bank of Montenegro (CBCG) tracks and aligns its policies with those of the ECB, effectively making the ECB true Montenegrin -if remote- central bank. Put differently, unilateral dollarisation is best viewed as a way to import monetary stability at the expense of losing financial and economic sovereignty [Eichengreen, 2001]. Thus, fiscal policy dominates policy making arena as the only ingredient specifically tailored to domestic needs. This is to the extent a reenforcing mechanism, since unilateral dollarisation significantly reduces FX risk thereby lowering interest rate spread (risk premium) which in turn makes easier and

[3] For broader and up-to-date macroeconomic, climate, demographic and sectoral details, see MONSTAT (2025) and MONSTAT (2025*)

[4] Owing to the fact that Montenegro has never had its own currency, except for a brief period at the beginning of the XX century, and the fact that it is a very small economy, wide-open to international trade and tourism, authorities opted for unilateral dollarisation [Zuk, 2019].

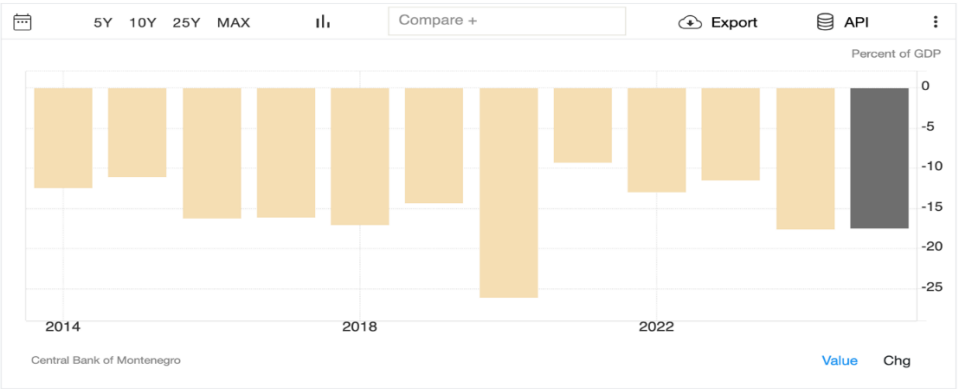
cheaper to raise and repay fiscal burden in hard currency [Berg-Borensztein, 2000].

Be that as it may, if one searches for empirically supported macrofinancial posterchild of repudiating suboptimal domestic currency, one should look no further than Edwards (2001*), who after investigating historical record of economic performance by officially and fully dollarised countries, has found that those countries *a)* have had visibly lower inflation rate, *b)* have grown significantly slower than others while *c)* maintaining similar fiscal record yet *d)* without being spared of occasionally dramatic capital flow reversals. Moreover, Edwards (2001) underscores that in absence of an independent national currency to devalue, officially dollarised countries must indirectly adjust to external shocks through painful deflationary measures, such as cutting wages and prices. Therefore, nominal rigidities as a rule bind more forcefully once economy dollarises [Hausmann-Powel, 2000].

But how has Montenegro fared in those respects? For years, it appeared all has settled well: inflation fell and remained rather low, even ocassionally dipping into negative territory, interest rates also followed global downward suit, while real GDP growth and banking assets grew moderately but steadily [Lakic-Sehovic-Cetkovic, 2016]. Nevertheless, global financial crisis back in 2008 and onwards unearthed the chief intrinsic weaknesses of Montengro's new development strategy. Namely, country's current account deficit stood out among her peers, at first driven by financing trafic infrastructure built entirely by foreigners, whereas it later on reached circa 50% of GDP during the global financial crisis [Cashman-Merling, 2023]. Notwithstanding the brief stalemate, again in 2020, Montenegrin tourism-dependent economic model experienced a sharp contraction (of over 15%) triggered by COVID crisis and thereupon country's macroeconomic parameters kind of have gone zig-zagging, therby signalling the actual fragility of her economy. After country's economy rebounded initially thanks to decisive removal of antiepidemic measures in Europe, pentup demand and substantial inflow of rich imigrants, although at the expense of inflation overshooting 13% in 2022, fundamentals clearly became unreliable yet again. Growth has moderated from an average of 9% during 2021-2023 to unconvincing 3.2% in 2024 and the first half of 2025, projected to further fall to meagre 2% over medium run. What's more, growth is almost entirely consumption driven. Headline inflation, which fell sharply by some 12 percentage points from September 2022 to September 2024, backfired yet again to almost 5% *p.a.* in September 2025 [IMF, 2025]. Similarly, following marked improvement in 2021-2023, both fiscal stance and external position of Montenegro have started to deteriorate at an alarming pace. Budget deficit has already pierced well through the Maastricht criterion and moreover is expected to reach 4% by 2030, while balance of payments deficit has widened by almost 8% of respective GDP in the last four years and

stands at 18.2% of Montengrin GDP as of September 2025 [*Ibidem*]. In the context of unilaterally dollarised economy, such external deficit means that country constantly yearns for foreign sources of finance, either via foreign direct investment, remmittances or external debt so as to fill the chronic balance of payments' gap [Cashman-Merling, 2023]. Even though non-performing loans stat has improved lately, bank credit to both households and businesses has been increasing too fast for comfort in the last couple of years, quite in line with spectacular real-estate bubble of apparently speculative nature. Fed predominantly by investment from overseas (coupled with plausible round-tripping too) in our opinion, real estate prices in Montenegro have increased by 128% in real terms over the course of just five years [IMF, 2025].

Graph 1: Montenegro's current acount



Source: CBCG&TradingEconomics, https://tradingeconomics.com

In a nutshell, Montenegrin economy's main challenges in near term will be subpar industrial policy and neglected manufacturing (on both SME and corporate scale) coupled with insufficient investment in knowledge cum innovation, abused fiscal domination and rising external imbalances, which would have to be addressed urgently by sustainable growth and development strategy, fiscal consolidation and public finance reform, as well as skilful real exchange rate management. If left unchecked, nominal wage dynamics, demographic trends and twin deficit crisis may soon burst her real-estate bubble and cause significant fall in living standard, whereas already elaborate real exchange rate appreciation might easily topple what's left of Montenegrin coastal tourism in the meanwhile. Hence, we briefly analyse each of the earmarked bottlenecks and offer quick macroeconomic routs that country's policy makers could ideally take.

MODERN INDUSTRIAL POLICY AND SMART DEVELOPMENT

On of the key recommendations emphasised by the IMF (2025) for Montenegrin authorities is the urgent need to plan and carry out structural reforms aimed at diversifying the economy in order to make it more resilient to global shocks that affect tourism and remove addiction to external financing of unsustainable public and private expenditures. This in other words, above all, hints at more impactful and more seriously taken industrial policy, which ought to eliminate Dutch disease-shaped corollaries that have accumulated thus far. Country's lack of external (both qualitative and price) competitiveness, relatively high unemployment and steadily decreasing trade levels with the EU ever since the global financial crisis make it increasingly difficult to address the aforementioned imbalances [Cashman-Merling, 2023]. In addition, Lakic, Sehovic and Cetkovic (2016) conclude that their empirical analysis of Montenegrin economy implies this is in part attributable to the chosen monetary&currency regime, yet partly her monetary&currency regime gets undermined by independent politico-economic weaknesses and country's deteriorating economic environment en general.

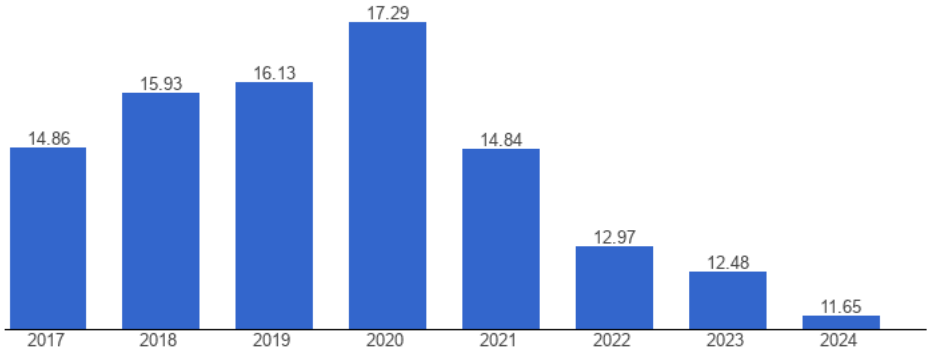
Now, as a micro-state with small population, Montenegro cannot hope to develop a seriously large scale manufacturing industry, but it just may and moreover should focus on half a dozen production objectives that would broaden and complement her economic hospitality-b(i)ased asortment of goods and services. Some of them might grow quite nicely within the small-scale high-value SME sector, whereas others may florish within state-assisted private or PPP-molded corporations either as restauration&revival of old Yugoslav capacities or indeed as an infant industry pilots.

Further still, Montenegro's industrial policy must seamlessly blend into her overall growth and development strategy, as well as exhibit time-consistency with country's EU accession agenda, which is certainly not easy nor impossible task.

If one critically reviews the goals and implementation of Montenegro's official industrial policy document from 2019 to 2023, one gathers that conteporary industrial production in Montenegro has been experiencing the free fall ever since 2020. As of late, it takes up only about 12-13% of country's GDP and is dominated by production of eletricity. Back in 2024, share of industrial production (including manufacturing, utilities, construction and mining) in Montegrin GDP stood even lower at 11,65%. Even though revitalising industrial production was identified as a top priority in the last industrial policy strategy for Montenegro [Ministry of Economy, 2019], strategy turned out to be overambitious, underfinanced and uncoordinated wish list that has never really gained traction, additionally hampered by the

outbreak of COVID 19. As the imediate challenges to competitivness growth in Montenegro, previous strategy identifies: accelerating deindustrialisation, dominant role of traditional industrial export sectors with low value added, low utilisation of scientific potential, regional disparities (at the expense of underdeveloped north), insufficient capital as well as knowledge investment in SMEs [*Ibidem*].

Graph 2: Industrial value added as percentage of Montengrin GDP



Source: TheGlobalEconomy.com

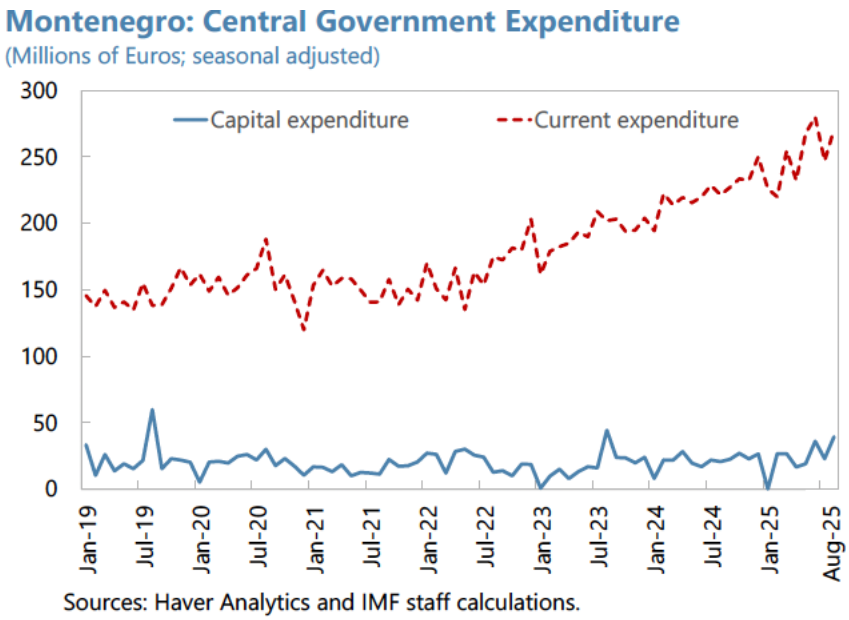
Montenegro's industrial policy, therefore, needs to markedly enhence the quality of its medium and higher education institutions, together with incentivising much closer cooperation between science (or knowlegde-intensive hubs) and businesses, probably via public or publicly overseen R&D scheme(s). This cannot be stressed enough, since trends in manufacturing presuppose less and less labour inputs, yet more AI and the usual (inflation-adjusted) ammount of financial incentives. Instead of classic infant-industry argument or fascination with attracting FDI, modern industrial policy must strike a balance between import substitution and export promotion, i.e. often emphasise domestic investment, place- and circumstance-based policies empowering local government that has to tailor to the needs of targeted industries [Juhasz-Lane-Rodrik, 2023]. Thus, Montenegrin policy makers should come up with industrial strategy more focused at productivity gains not only in meticulously selected manufacturing, but also in the labour-intensive service sector, including off-coastal tourism, with much broader, sometimes stealthier and in any case a lot more flexible set of instruments&incentives in comparison with traditional trade policy measures or ostentatious goverment subsidies. However, spells of protectionism tuned to a certain degree are agruably inevitable, yet ought to be carefully chosen in size and duration cum diplomatically negotiated with European Commission and other influential parties.

TWIN DEFICITS HURDLE

From a theoretical standpoint, by removing inflation tax (government's potential to print money for deficit monetising purposes), dollarisation forces sovereigns to adhere to stricter, harder budget constraints [Eichengreen, 2001]. However, numerous models suggest that sooner or later fiscal expansion ensues, leading to a worsening of the current account and an appreciation of the real exchange rate [Kim-Roubini, 2009]. Montenegro's economy is no exception with respect to described pattern.

For quite a while salaries have been exceeding productivity (proxied by unit labour costs), gap between government's current expenditures and capital expenditures has been widening, on a top of recently weakened fiscal position with 3,6% budget deficit in 2025, national defense spending is projected to more than double over the next 10 years according to NATO guidelines, fiscal sustainability in demographic terms is also far from brilliant in spite of considerable immigration as of late, which collectively points at textbook case of twin deficits trouble. In other words, Montenegro's example warns that maintaining competitiveness and macroeconomic stability in a country without its own currency requires rigorous adjustment in fiscal policy [Zuk, 2019].

Graph 2: Current vs. capital expenditures



However, inception of Montenegro's macroeconomic predicament could be traced back to the real estate bubble blown through opening seaside property for privatisation and sell-off to non-residents, followed by reducing the country's manufacturing activity back in the 1990s, only to bet all on mass tourism and shuttle trade instead. For as long as capital poured in, yet tourist services remained price competitive to compensate for subpar quality in comparison with such summer holiday giants like Greece, Turkey, Spain, Cyprus or Croatia, growth didn't lag behind too much nor were economic disabilities brought by Dutch desease features overly ostentatious.

Distinctive from seminal work by Corden and Neary (1982), Montenegrin conciously booming sector (summer tourism) was very tradable, so much so that shrinking and technologically challenged manufacturing apparently didn't matter. On the outset, wage was the same across sectors and equal to each unit of sectoral output multiplied by its marginal product of labour. Clearing condition for non-tradable market had been:

$$Y^N(L^N)=C^N(P^N/P^T_{mnf,}\ Y) \qquad (1)$$

However, pretty soon nontradable goods and services became ever more expensive (together with fringe benefits) due to political favourisations of ruling party voters employed in goverment or municipal posts as well as nagged more broadly by the Harrod-Balassa-Samuelson effect stemming from tourism onto the rest of economy. Thus, two effects identified in Corden and Neary (1982), the resource movement effect (which enabled direct deindustrialisation after raising marginal product of labour in the booming tourism sector), and the spending effect (the indirect deindustrialisation via increased domestic demand for both non-tradables and foreign tradables thereby having pulled the labour and capital investment from manufacturing into non-tradable sector), coupled with gradually worsening external competitivenss of Montenegrin tourism, justify abandoning three-sectoral nature of Dutch desease paradigm in favour of two-period and two-sectoral model of twin crisis.

Initial supposition in the twin deficit model is that causality could theoretically run both ways, or that both current account deficit and budget deficit might be codetermined [Malovic, 2016]. Model itself is laid down by combining important blocks of descrete-time algebra by Harms (2016) and Schmitt-Grohe, Uribe and Woodford (2022), who in turn benefit from continuous-time contributions of Turnovsky (1997), Vegh (2013) and Niepelt (2019), *inter alia.* If unappealing external imbalance pins down private expenditures, surge in goverment spending potentially offers incremental utility for the representative consumer, but characterised by additive separability: variations in G don't alter marginal utility of private consumption [Harms, 2016]. Within a two period model consumers maximise

$$U_1=u(C_1)+v(G_1)+\beta[u(C_2)+v(G_2)] \qquad (2)$$

s.t.

$D_2^{priv}=Y_1+ (1+i^*)D_1^{priv}-T_1-C_1$ *(3)*

$D_2^{gov}=T_1-G_1+(1+i^*)D_1^{gov}$ *(4)*

and obviously subject to the representative consumer's intertemporal budget constraint:

$C_1+C_2/(1+i^*)=Y_1+Y_2/(1+i^*) -G_1 -G_2/(1+i^*)$ *(5)*

In such a simple two-period setting current account balance coincides with net foreign assets position so that

$B_1= D_2^{priv}+ D_2^{gov}$ *(6)*

If we further simplify -in order to pitch the main mechanics of the model- by assuming that discount rate equals (world) interest rate which implies constant consumption and production over time, then that $G_1>0$, $G_2=0$, such that sovereign chooses to finance part of the increased G_1 with rising taxes in period one and remains by incurring debt, then equations *(3)* and *(4)* summed up collapse into

$B_1=-G_1/(2+i^*)$ *(7)*

Notwithstanding the fact that the size of the first period budget deficit affects the composition of a country's net foreign assets at the start of the second period, it obviously doesn't affect the size of the balance of payments, since rational behaviour of private and public sectors intertemporally cancel each other out. This is, of course, a well-known result in open economy macro, under a pretext of the so-called Ricardian equivalence: faced with future tax burden caused by the present tax cut and/or momentary hike in government expenditures, representative agent cuts consumption, thereby saving for the time of fiscal restriction. Ricardian equivalence, alas, usually hasn't held the scrutiny of empirical verification for four main reasons: *1)* households are often credit constrained (cannot freely borrow against future income), *2)* contemporaneous intergenerational link weakens (many people don't have kids, or do not leave bequests so that future taxes fall on those who didn't have a say in or benefit from earlier consumption decisions), *3)* sovereign may enjoy higher creditworthiness/lower cost of debt than households and finally *4)* taxation is seldom calibrated in a manner that the amount of taxes paid is independent from households' economic decisions henceforth. Therefore, if we dwell not in the Ricardian world, increased government spending through equations *(4)* and *(5)* brings about worsening of country's external balance in equation *(6)*.

Ergo, after showing algebraically that an increase in government spending can and as a rule of thumb does create twin deficit crisis when taxes are lump sum and Ricardian equivalence fails, we proceed to include the role of investment and develop sequence of events in the richer structure of the same base model but this time under distortionary taxation. Namely, firms in the economy use a share of the borrowed funds in period one to invest in

capital goods that aided by technology A_2 produce consumer goods which contribute to national income in period two, earning them profit at the end of each generation's lifetime [Schmitt-Grohe -Uribe-Woodford, 2022]:

$$Y_2=A_2f(I_1)\ ;\ \Pi_2=Y_2-(1+i^*)I_1 \qquad (8)$$

The new version of equation *(5)*, honouring no-Ponzi condition in period two, world interest rate and on it dependent firms' profit, along with consumption-proportional (distortionary) taxation yields improved intertemporal budget constraint as in equation *(9)*:

$$(1+\tau_1)C_1+(1+\tau_2)C_2/(1+i^*)=(1+i^*)D_0^{priv}+Y_1+\Pi_2/(1+i^*) \qquad (9)$$

The current account balance is now defined by

$$B_1=Y_1-A_1+i^*D_0\ ;\ A_1=C_1+I_1+G_1\ ;\ D_0=D_0^{gov}+D_0^{priv} \qquad (10)$$

After solving *(9)* for C_2 in order to maximize lifetime utility function expressed solely in first period consumption, problem of household becomes choosing C_1 to get the best out of

$$\ln C_1+\ln\{(1+i^*)[Y_\mu-(1+\tau_1)C_1]/(1+\tau_2)\}\ ;\ Y_\mu=(1+i^*)D_0^{priv}+Y_1+\Pi_2/(1+i^*) \qquad (11)$$

At last, Schmitt-Grohe, Uribe and Woodford (2022, p. 173) demonstrate that taking partial derivative of *(11)* with respect to C_1 and equating it to zero yields a rather intuitive Euler intertemporal condition:

$$C_2/C_1=(1+i^*)(1+\tau_1)/((1+\tau_2) \qquad (12)$$

If we additionally express C_2 from *(12)* and plug it back to intertemporal budget constraint *(9),* we obtain the equilibrium level of first period consumption in presence of distortionary taxation, according to which C_1 is clearly falling with rise in τ_1, whereas the impact of increased τ_2 appears to be more ambiguous for interplay between substitution and income effects. Nevertheless, sheer cut in period one distortionary taxes lifts the period one consumption and through equation *(10)* causes deterioration of current account balance. Similarly, since from equation *(4)* follows that government saving in the first period under consumption-proportional taxation equals

$$S_1^{gov}=i^*D_0^{gov}+\tau_1C_1-G_1 \qquad (13)$$

out of which it is relatively straight-forward to prove that decline in τ_1 indeed provokes widening of budget deficit [*Ibidem*]. Thus, holding τ_1 unaltered, equation *(10)* confirms that an increase in government spending generates twin deficit under distortionary taxation too. But why would taxes remain unchanged in the face of rising government spending?

As a matter of fact, adjustment of government spending in Montenegro would have to be pointed at contracting the aggregate wage expenditures, while VAT would have to go up, thereby running a risk of raising marginal vulnerability of Montenegrin tourism. If private savings surge enough in response to fiscal restriction, higher future taxation will be met with higher capital incomes and private consumption could be slashed to a lesser extent [Harms, 2016, p.133]. In any case, price level in Montenegro ought to go down a notch or two in an attempt to regain external price competitiveness of her

exports as well as to ease the nominal wage transition aligning itself with average labour productivity. But what prices would have to change to that end and by how much on the ground? When splitting the consumption bundle into the tradable and non-tradable components in the Cobb-Douglas style, the utility derived under assumption that (intratemporal) elasticity of substitution stays one is:

$C_t=(C_t^T)^{\gamma}(C_t^N)^{1-\gamma}$; $t=1,2$ *(14)*

So, marginal rate of substitution between non-tradable and tradable consumption within each period is given by

$$s'_{N,T}=\frac{\gamma}{1-\gamma}\frac{C_t^N}{C_t^T} \quad (15)$$

By the same token, one must now express intertemporal budget constraint in terms of tradable goods via relative price of non-tradables expressed in tradables

$p_t^{REL}=P_t^N/P_t^T$ *(16)*

From representative consumer's budget constraint and previous three equations it is pretty elementary to derive that

$$C_t^N=\frac{1-\gamma}{\gamma}C_t^T/p_t^{REL} \quad (17)$$

Following Harms (2016, p. 154), from intertemporal Euler equation we arrive at

$C_2^N/C_1^N=(P_1/P_2)^{(1-\sigma)/\sigma(1-\gamma)}$ *(18)*

In addition, maintaining that in every period under rational behaviour all the perishable non-tradables produced must also be consumed or built in tradables: $Y_t^N=C_t^N$, while somewhat simplified balance of payments yields

$B_t=Y_t^T-C_t^T$ *(19)*

one can at last relate the current account balance to the temporal pattern of tradable and non-tradable output and their intended use:

$$B_1= Y_1^T- \frac{Y_1^T+\frac{Y_2^T}{1+i^*}}{1+(1+i^*)^{-1}\left(\frac{Y_2^N}{Y_1^N}\right)^{\frac{(1-\gamma)(1-\sigma)}{1-\gamma+\gamma\sigma}}} \quad (20)^5$$

This expression, obviously, isn't sufficiently tractable but speaks loud enough at least two important truths. Firstly, TNT model enables us to formally confirm that current account of open economies in general, and of Montenegro in particular, depends not only on the extent of growth and constraints imposed by the world interest rate, but also upon sectoral activity and redistribution between tradable and non-tradable universe. Hence, the ability to grow alongside modest external deficit (or even managing to run a surplus) may not be primarily driven by constraints on borrowing, but by anticipated decline of

[5] Variable σ in *(20)* denotes intertemporal elasticity of substitution.

the aggregate price level and potential rise in national savings [Harms, 2016, p. 155].

Finally, with respect to twin deficits, what insights offers two-sectoral model on the fiscal side of the economy? Assuming that tradables and non-tradables are Edgeworth substitutes, Vegh (2013) looks into temporary fiscal expansions via increased government spending on tradable and non-tradable goods, respectively. Unanticipated and temporary surge in G_t^T, given that

$$T_t=G_t^T+p_t^{REL}G_t^N \quad (21)$$

and considering that the present discounted value of public spending of tradables subsequently rises, will result in: lowering of C_t^T, jump in price of tradables and fall in relative price of non-tradables. Furthermore, from

$$C_1^T=i*B_0+Y_1^T-G_1^T \quad (22)$$

we gather that fall in consumption of tradables must be smaller than corresponding initial rise in government absorption of tradables. Thus, trade balance clearly worsens during fiscal expansion and somewhat improves thereafter, whereas current account balance deteriorates before ever slightly improving once consumption smoothing is over with [*Ibidem,* pp.170-174]. When it comes to unanticipated and temporary surge in G_t^N, private consumption of non-tradables drops for the time being, while consumption of tradables increases along with the jump in relative price of non-tradables. To see why this temporary government overspending of non-tradables provokes worsening of the trade balance and current account, it is sufficient to observe that an increase in G_1^N reduces non-tradable resources available to the private sector (households and firms) and since the two goods are Edgeworth substitutes, reduction of non-tradables in consumption basket raises marginal utility of absorbing tradable goods, which leads to higher C_1^T and deterioration of country's external position. However, when G_2^N falls back to its initial level, both C_2^T and p_2^{REL} will also drop with even greater magnitude [Vegh, 2013, p. 175-177]. Consequently, trade balance would improve almost as much as it previously deteriorated, whereas balance of payments' "V-shaped" recovery should improve ever so slightly above its initial demise on impact.

Be that as it may, one omnipresent variable -thus far left behind the curtains- fundamentally determines and effectively drives external competitiveness of small open economies all along, especially unilaterally dollarised entities like the Montenegro: namely, a real (effective) exchange rate. That is the reason why we reserved the final push of this paper for analytical and policy-relevant note on the real exchange rate management in a fully dollarised small open economy.

REAL EXCHANGE RATE MANAGEMENT

Real exchange rate is often defined in international finance as the properly deflated nominal exchange rate, even though better and much more useful definition states that while nominal exchange rate represents a relative price of two currencies, real exchange rate represents a relative price of two national outputs [Malovic, 2016]. In the context of the two-sectoral model utilised in this paper, it is more intuitive to define real exchange rate as the

$$\varepsilon^{®}=\varepsilon\, P^{*}(P^{T*}, P^{N*})/P(P^{T}, P^{N}) \quad (23)$$

Aided by the facts that *a)* functions of both foreign and domestic price indices are homogeneous and *b)* law of one price holds for tradable goods, following Schmitt-Grohe, Uribe and Woodford (2022, p.236) real exchange rate may be rewritten as

$$\varepsilon^{®}=f^{*}(1, p_t^{REL*})/f(1, p_t^{REL}) \quad (24)$$

Additionally, from small open economy's perspective it seems reasonable to take foreign relative price of non-tradables as given. With that in mind, expression could be further approximated by

$$\varepsilon^{®}\approx P^{T}/P^{N} \quad (25)^{6}$$

so that higher price of non-tradables implies real exchange rate appreciation and vice versa [Niepelt, 2019, p. 91]. Moreover, real exchange rate shouldn't be confused with the so-called terms of trade, since $tot=P_t^{X}/P_t^{M}$ measures purchasing power of country's exports in terms of its imports. Thus, rise of $\varepsilon^{®}$, i.e. real depreciation indicates improvement in external price competitiveness of domestic output but simultaneously deterioration in country's terms of trade [Malovic, 2016, p.80]!

Therefore, channels through which policymaker can influence real exchange rate in absence of nominal exchange rate as macroeconomic policy instrument, are structural (supply-side) policies that affect productivity (choice and quality of both tradables and non-tradables produced, wage policy vs. unit labour costs to slow down Harrod-Balassa-Samuelson effect[7] etc.) and macroprudential measures (capital controls, reserve requirements, quasi-FX intervention, fiscal policy). Put differently, real exchange rate management under unilateral dollarisation boils down to internal macroeconomic adjustment over the medium run, potentially guided or incentivised by the policymaker, rather than short-run external devaluation. It is doable, albeit less immediate and seldom politically cheap. To deploy real exchange rate

[6] For better or worse, in empirical practice, price index of tradables is sometimes substituted with price index of country's imports...

[7] For more details on Baumol-Bowen effect (secular increase in the realtive price of non-tradables) leading to HBS effect, namely spontaneous real exchange rate appreciation in countries with faster productivity growth and higher incomes in tradable sectors that translate into less productive non-tradable sector, see Niepelt (2019, p.94).

management in such circumstances, maintaining policy discipline and political will above and beyond individual electoral cycle is required in as much as real exchange rate effects must be carefully coordinated with overall industrial and trade policy of the country at hand.

CONCLUDING REMARKS

We have shaped this paper to discern both obvious and less visible ramifications of unilateral dollarisation for macroeconomic policymaking in Montenegro. We have argued that Montenegro's overreliance on (summer) tourism has already developed Dutch disease symptoms, regional inequality within a country and high sensitivity of her economy to exogenous shocks. After screening the stylized facts and statistical data from recent years, it becomes patently obvious that Montenegro has been facing dire straits between imperatives of partial reindustrialisation, fiscal consolidation and improvement in her balance of payments. In a nutshell, Montenegrin economy's main challenges in near term will be subpar industrial policy and neglected manufacturing (on both SME and corporate scale) coupled with insufficient investment in knowledge cum innovation, abused fiscal domination and rising external imbalances. To that end, we have offered a glimpse of industrial policy Montenegro should try to launch, reviewed earmarked macroeconomic bottlenecks on her way and given possible housekeeping getaways ahead of the country's EU integration agenda.

Times of neoliberal mantra that industrial policy is unnecessary and ultimately impossible are at last gone by, but space for deploying effective industrial strategy may be more limited -yet of utmost importance- for small open economy under unilateral dollarisation. Knowledge intensive, tailor-made, regional (or municipal) rather than aggregate, smart and stealthy moves make up contemporary blueprint for successful industrial policy.

However, prerequisite for constructing such a policy is macroeconomic stabilisation. In Montenegrin case, that commands subduing simultaneous budget and balance of payments deficits, with fastidious attention to consequences -of stabilisation instruments as well as subsequent smart development and selective reindustrialisation agenda- for tradable vs. non-tradable sector in respect to their output and prices. To that end, channels through which policymaker can influence real exchange rate in absence of nominal exchange rate as macroeconomic policy instrument, are structural (supply-side) policies that affect productivity and macroprudential measures. To utilise real exchange rate management in such circumstances, maintaining policy discipline and political will above and beyond individual electoral cycle is required in as much as real exchange rate effects must be carefully

coordinated with Montenegro's overall industrial & trade policy and prospective EU accession.

REZIME
POSLEDICE JEDNOSTRANE DOLARIZACIJE ZA KREIRANJE MAKROEKONOMSKE POLITIKE: ŠTA ČEKA CRNU GORU?

S obzirom na donekle neobičnu putanju Crne Gore ka evropskom monetarnom ujedinjenju, u ovom radu pokušavamo da prikažemo kako očigledne tako i manje vidljive posledice po crnogorske makroekonomske poslove uoči njene integracione agende. Glavni izazovi crnogorske ekonomije biće loša industrijska politika, zajedno sa nedovoljnim ulaganjima u znanje i inovacije, zloupotrebom fiskalne dominacije i rastućim spoljnim disbalansima, što bi moralo hitno da se reši strategijom održivog rasta i razvoja, fiskalnom konsolidacijom i reformom javnih finansija, kao i veštim upravljanjem realnim deviznim kursom. Ako se ne kontrolišu, dinamika nominalnih plata, demografski trendovi i kriza dvostrukog deficita moglo bi uskoro da dođe do pucanja balona nekretnina i izazivanja značajnog pada životnog standarda, dok bi već razrađena apresijacija realnog deviznog kursa mogla lako da sruši ono što je ostalo od crnogorskog primorskog turizma u međuvremenu.

Ključne reči: Dolarizacija, Crna Gora, holandska bolest, fiskalna politika, dvostruki deficiti, dvosektorski model, realni devizni kurs

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Ovaj rad je primljen **02.12.2025,** a na sastanku redakcije časopisa prihvaćen za štampu **23.12.2025.** godine.

UDK: 005.336.5

Original Scientific Article

POSLOVNA EKONOMIJA
BUSINESS ECONOMICS
Godina XIX
Broj 2
Str: 18 – 32
DOI: 10.5937/poseko28-64315

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EMPIRICAL VALIDATION OF THE AUTHENTIC LEADERSHIP QUESTIONNAIRE (ALQ) IN SERBIAN

ABSTRACT: In this pilot study, the validity of the Serbian translation of the Authentic Leadership Questionnaire (ALQ - Avolio, Gardner, and Walumbwa, 2007) was tested. The study was conducted on a sample of 77 employed students who evaluated their direct superior. Reliability, construct, divergent, convergent, and predictive validity of the ALQ and its subscales (Self-awareness, Internalized moral perspective, Balanced processing, and Relational transparency) were validated.
The results suggest that the ALQ in Serbian is an instrument of sufficient quality to be used in domestic research practice, but it should be used with caution because of the peculiarity of the Serbian employed population in relation to their expectations from their leaders.
The Authentic Leadership Questionnaire (ALQ) in Serbian needs further development.

Keywords: ALQ, authenticity, leadership, Serbian

INTRODUCTION

Leadership is a process of influencing a group of individuals to achieve shared objectives. Even though leadership is part of contemporary management, it is important to note the difference between leadership and

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management. The primary function of leadership is to produce change and movement, while the primary function of management is to provide order and consistency to organizations (Northouse, 2013). As both leadership and management are processes, anyone can execute one or the other function at different times. Leaders are not leaders simply by virtue of the position they hold in organizations.

The concept of leadership is conditioned by economic, social, and cultural conditions. In Serbia, modern-day leaders face numerous problems – the absence of a clear notion of their company's goals, inappropriate rewarding of effort, partial focus on profit, a monopolistic position of the company, negative selection, lack of new trends in work organization, and many others (Glomazić, 2011). The same author concludes that in our culture, the central criterion of success is possession of power, reflected in material wealth and relations with significant others. Another study (Ajduković, 2007) showed that people in Serbia agree that leadership is needed in society but do not perceive successful individuals as leaders in the proper sense of the word. Serbian citizens feel that the basic characteristics of our leaders are greed, unscrupulousness, and manipulativeness, whereas honesty, i.e., authenticity, comes last on this list.

The new concept of positive leadership is called authentic leadership. Authenticity implies owning one's personal experiences, whether their thoughts, emotions, needs, preferences, or beliefs, and behaving in accordance with the true self (Harter, 2002). Authentic leadership draws on positive psychological capacities such as authenticity and a developed organizational context, whereas the same factors result in increased self-awareness and behaviors of a leader's self-regulation (Luthans & Avolio, 2003). Starting from this basic idea of authentic leadership, Walumbwa and associates (Walumbwa, Avolio, Gardner, Wernsing, and Peterson, 2008) defined authentic leadership as a pattern of a leader’s behavior that draws upon and promotes both positive psychological capacities and a positive ethical climate, fosters greater self-awareness, an internalized moral perspective, balanced processing of information, and relational transparency on the part of leaders working with followers, thus fostering positive self-development. In this definition, self-awareness refers to demonstrating an understanding of how one derives and makes meaning of the world and how that meaning impacts the way one views oneself over time. It also refers to showing an understanding of one’s strengths and weaknesses and the multifaceted nature of the self, which includes gaining insight into the self through exposure to others, and being cognizant of one’s impact on other people (Kernis, 2003). Relational transparency refers to presenting one’s authentic self (as opposed to a fake or distorted self) to others. Such behavior promotes trust through disclosures that involve openly sharing

information and expressions of one's true thoughts and feelings while trying to minimize displays of inappropriate emotions (Kernis, 2003). Balanced information processing refers to leaders who show that they objectively analyze all relevant data before coming to a decision. Even though these elements of authentic leadership are often researched as separate constructs (Walumbwa, Wang, Wang, Schaubroeck, and Avolio, 2010), some authors have researched these elements as key components of authentic leadership (Kernis & Goldman, 2005) and showed that the resulting factor is positively correlated with psychological well-being, life satisfaction, and high self-confidence.

Based on the model described, the Authentic Leadership Questionnaire was developed (Authentic Leadership Questionnaire – ALQ; Avolio, Gardner, and Walumbwa, 2007). The questionnaire contains questions about four different dimensions of authentic leadership – Self-awareness, Internalized Moral Perspective, Relational Transparency, and Balanced Processing. The construct of authentic leadership has been used in different contexts and with different groups (Northouse, 2013; Onorato & Zhu, 2014). The majority of research that has confirmed the factor structure of the original scale was done in developed countries, with employed respondents asked to evaluate their direct superiors – USA, China, Portugal, Belgium, Canada, Germany (Walumbwa et al., 2008; Datta, 2015). However, different authors concluded that there are certain problems in the structure (Neider & Schriesheim, 2011), among which the most numerous are those reported by the authors of adaptations of the Authentic Leadership Questionnaire (Du Plessis, 2014; Dimovski, Ferjan, Penger, Marič, and Černe, 2013; Rego, Sousa, Marques, and Pina e Cunha, 2012; Moriano, Molero, and Lévy-Mangin, 2011) used in countries where English is not the first language of respondents – South Africa, Slovenia, France, Italy. It is important here to consider the fact that in different cultures, managerial behavior is conceptualized differently, items are interpreted differently, and individuals respond differently to an instrument's response scales (Byrne & Watkins, 2003). Research into authentic leadership is still in development, and future studies may also include other variables (e.g., cultural) that can help define authentic leadership more clearly (Avolio & Mhatre, 2012).

In this paper, the author describes a pilot study aimed at an empirical validation of the Serbian translation of the Authentic Leadership Questionnaire (ALQ) conducted on a sample of working students in order to reduce possible errors and oversights in the Serbian translation of the ALQ.

The aim of this pilot research was an empirical validation of the Serbian translation of the Authentic Leadership Questionnaire (ALQ) on a sample of working students. To the best of our knowledge, the current study is the first

to evaluate the validity of the Serbian translation of the Authentic Leadership Questionnaire (ALQ).

METHOD

Sample and procedure

The sample consisted of working students (N = 77) from the University of Novi Sad (male students – 27%, female students – 73%) who were given the task of evaluating their immediate superiors. The average age of the respondents was M = 30.06, and the average length of service was M = 5 years.

Participation in the study was voluntary, and participants were advised that they were free to withdraw at any time. As it was a paper-and-pencil survey, all instruments were administered during the academic year 2015/16. After completion of the survey, participants were debriefed on the nature of the research, and all questions were answered.

Instruments

Authentic Leadership Questionnaire (*ALQ* – Avolio, Gardner, and Walumbwa, 2007, http://www.mindgarden.com). The scale contains 16 items, and the respondents were asked to judge how frequently each statement fit their supervisor using a 5-point scale ranging from 1 (not at all) to 5 (frequently, if not always). The scale consists of four subscales – self-awareness (4 items), internalized moral perspective (4 items), balanced processing (3 items), and relational transparency (5 items).

Authenticity in Relationships Scale (*AIRS*; Lopez & Rice, 2006). The Authenticity in Relationships Scale measures two interrelated dimensions of relational authenticity. The subscale Unacceptability of Deception consists of 12 items and measures the level to which a respondent is willing to refrain from deceptive or false-self behavior and the assessment of the other person. The subscale Intimate Risk Taking measures the degree to which a respondent is willing to reveal personal, intimate thoughts and feelings to the other person and consists of 10 items. The respondents evaluated the items on a Likert-type scale – from 1 (does not describe me well) to 9 (describes me very well). In this research, the subscale Intimate Risk Taking showed internal consistency $\alpha = .90$ (M = 79.45, SD = 16.26), and the subscale Unacceptability of Deception $\alpha = .86$ (M = 44.89, SD = 19.51).

MHI-38 (*Mental Health Inventory – 38*; Veit & Ware, 1983). MHI-38 is a 38-item questionnaire composed of six subscales, within two general scales – Psychological Distress (anxiety – 9 items, depression – 4 items, loss of

behavioral/emotional control – 9 items) and Psychological Well-being (general positive affect – 10 items, emotional ties – 2 items, and satisfaction with life – 1 item). The respondents used Likert-style responses, and the results range from 1–65 depending on the subscale, i.e., from 14–142 depending on the general scale. In this research, the general scale Psychological Distress showed internal consistency α = .89 (M = 47.46, SD = 14.57), and Psychological Well-being α = .75 (M = 51.41, SD = 10.65). Three subscales of the general scale Psychological Distress had internal consistency – Anxiety α = .90 (M = 23.58, SD = 7.43), Depression α = .87 (M = 8.12, SD = 3.39), and Loss of Control over Behavior/Emotional Control α = .72 (M = 25.58, SD = 2.84). Subscales of the general scale Psychological Well-being had internal consistency – General Positive Affect α = .90 (M = 31.09, SD = 8.48), Emotional Ties α = .65 (M = 5.43, SD = 2.56). The subscale Emotional Ties has only 2 items, which could be the cause of low internal consistency. The subscale Satisfaction with Life has only 1 item, with descriptive statistics (M = 2.71, SD = 1.02).

RESULTS

Descriptive statistics and validity

Table 1 provides the results of descriptive statistics and the validity of the ALQ and its subscales: Self-awareness, Internalized Moral Perspective, Balanced Processing, and Relational Transparency. The table presents intercorrelations for the subscales, correlations between the subscales and the total score of the ALQ, arithmetic mean, standard deviation, indicators of normal distribution for the total score of the ALQ and for each of the subscales, and the indicators of the reliability of the scale and its subscales.

Table 1. Analysis of the subscales of the Authentic Leadership Questionnaire (ALQ)

	Intercorrelations				**M**	**SD**	**r**	**Sk**	**Ku**	**⟨**
	1	**2**	**3**	**4**						
1.SA	1	.35**	.22*	.48**	15.70	2.36	.69**	-.58	.07	.50
2.IMP	.35**	1	.43**	.42**	15.12	2.38	.74**	-.02	-.79	.34
3.BP	.22**	.43**	1	.36**	13.63	2.74	.71**	-.39	-.07	.45
4.RT	.48**	.42**	.36**	1	14.98	2.74	.79**	-.32	-.42	.65
Total score	-	-	-	-	59.44	7.48	-	-.14	-.87	.72

*Note: SA – self-awareness, IMP – internalized moral perspective, BP – balanced processing, RT – relational transparency, M = arithmetic mean, SD = standard deviation, r=correlations between subscales and scale, (all results are significant at the level p<.01), Sk=skewness, Ku=kurtosis, α - Cronbach's alpha coefficient of internal consistency. Standard error for skewness is .274, and for kurtosis .541. * p<.05, **p<.01.*

Respondents generated an average score of 59.44 (SD = 7.48). The values of skewness and kurtosis for the distribution on the scale and subscales show mild skewness toward lower scores. Correlations of the subscales with the ALQ are positive, with r ranging from .69 to .79. All correlations are significant at the level $p < .01$. This result confirms the subscales' representativeness and the representativeness of the items for the whole scale.

Intercorrelations for the subscales fall within the range of .22 to .48 and are all statistically significant at the level $p < .01$. Their average value is .38. The obtained values of the intercorrelations confirm the discriminant validity of the subscales Self-awareness, Internalized Moral Perspective, Balanced Processing, and Relational Transparency.

Internal consistency of the ALQ is good and equals $\alpha = .72$, and the internal consistency of the subscale Relational Transparency is acceptable and equals $\alpha = .65$. Internal consistencies of the subscales Self-awareness, Internalized Moral Perspective, and Balanced Processing are below the lower acceptable limit and fall within the range of .34 to .50, which may indicate a high probability that not all items on a scale reflect the same underlying construct (original subscales Self-awareness, Internalized Moral Perspective, Balanced Processing, and Relational Transparency showed internal consistency of .92, .76, .81, .87 respectively [Walumbwa et al., 2008]; in the Polish adaptation, internal consistency of the scale is .80 [Sierpińska, 2013]; in the French adaptation, between .77 and .82 [Rego et al., 2012]; in the Chinese adaptation, .79, .73, .76, .72 [Walumbwa et al., 2008]; and in the Indian adaptation, internal consistency of the subscales ranges from .63 to .80 [Datta, 2015]). The results confirm internal consistency of the scale and the subscale Relational Transparency, but not of the subscales Self-awareness, Internalized Moral Perspective, and Balanced Processing. In order to increase reliability, corrections of the subscales were attempted by excluding certain items from the total score. However, these corrections resulted in a decrease of the internal consistency coefficient to an even lower value, which is why the author decided against the corrections. Low reliability of these subscales could be due to poor item selection for the ALQ, causing overlap of validity between the subscales, but it is also possible that the chosen items were inadequate for the Serbian sample's economic, social, or cultural characteristics, which also shape the concept of leadership in our country. In addition, the reason for these results could lie in the gender structure of the sample, as the majority of participants are female (73%).

Construct validity

Confirmatory factor analysis was used to check the factor structure of the Serbian translation of the ALQ, consisting of four subscales – Self-awareness, Internalized Moral Perspective, Balanced Processing, and Relational Transparency – so that the results could be compared to the results of confirmatory factor analysis conducted on the original scale and subscales.

The factor structure of the ALQ was examined using confirmatory factor analysis (hereinafter CFA) in the program LISREL 8.80, employing the maximum likelihood estimation method. The following indicators were used to assess model fit: chi-square (χ^2), the ratio of chi-square to degrees of freedom (χ^2/df), Root Mean Square Error of Approximation (RMSEA; Steiger & Lind, 1980), Standardized Root Mean Square Residual (SRMR), Comparative Fit Index (CFI; Bentler, 1989), Goodness of Fit Index (GFI), and Bentler-Bonett Normed Fit Index (NFI; Bentler & Bonett, 1980). In this research, the following values were considered indicators of a good fit: χ^2 with $p > .05$, ratio $\chi^2/df \leq 3$, RMSEA and SRMR $\leq .05$, GFI and NFI $> .90$, and CFI $> .93$ (Byrne, 1994).

CFA was used to test several models, which were also analyzed by the original authors (Walumbwa et al., 2008). First, a 1-factor model was tested to evaluate whether the ALQ represents a one-dimensional, general measure of authentic leadership. The results provided in Table 2 show that the values of all fit indicators for this model are 0, which implies a perfect or saturated (just-identified) model fit. This model results from an equal number of observed and expected frequencies of data, with degrees of freedom equal to zero, and is thus statistically useless (Hershberger, 2005). Given that a saturated model can serve for further research on non-saturated models, available control variables were added – gender, age, and length of service of the respondents. However, the result remained the same. Saturated and non-saturated models must be hierarchically organized to be statistically meaningful (Hershberger, 2005).

Next, testing was done on a 5-factor model of the ALQ, with four subscales and one general factor of authentic leadership, the same scale structure assumed by the original authors (Walumbwa et al., 2008). Values of all indices indicated a poor model fit. Lastly, a 4-factor model was tested, in which three correlated factors were specified (Self-awareness, Relational Transparency, and a new factor created by combining the two general factors, entitled Moral and Balanced Processing) along with one general factor of authentic leadership. As in other studies adapting the ALQ where English was not the first language of respondents (Datta, 2015; Dimovski et al., 2013), the model with three correlated factors and one general factor showed the best indicators, with values falling within the acceptable range.

Table 2. Fit indicators in confirmatory factor analysis

		χ^2	df	P	χ^2/df	RMSEA (90%CI)	SRMR	CFI	GFI	NFI
1-factor model		0	0	.00	0	0	0	0	0	0
5-factor (correlated)	**model**	196.52	89	.00	2.20	.13 (.11-.15)	.14	.50	.19	.38
4-factor (correlated)	**model**	3,13	3	.38	1.04	.01 (.0-.19)	.06	.99	.98	.93

Note: 1-factor = all items load onto the same factor; 5-factor = four theoretically assumed, correlated factors Self-awareness, Internalized moral perspective, Balanced processing, Relational transparency and one general factor of authentic leadership; 4-factor = 3 factors and one general factor of authentic leadership; RMSEA = Root mean square error of approximation; SRMR = Standardized root mean square residSAL; CFI = Comparative fit index; GFI = Goodness-of-fit index; NFI = Normed fit index.

Discriminant and convergent validity

Table 3 shows the results of discriminant and convergent validity of the three factors, demonstrating a good model fit for authentic leadership. Discriminant validity is represented by Pearson's r, or zero-order correlation coefficients. Convergent validity is represented by the linear correlation coefficients between each of the factors and the subscales of the Authenticity in Relationships Scale (Unacceptability of Deception and Intimate Risk Taking) and MHI-38 (Psychological Distress – Anxiety, Depression, Loss of Behavioral/Emotional Control; and Psychological Wellbeing – General Positive Affect, Emotional Ties, and Life Satisfaction).

Table 3. Discriminant and convergent validity

	1	2	3	⟨	Authenticity in relationships		MHI – 38					
					UOD	IRT	A	D	LC	GPA	ET	LS
1. SA	1	.34**	.49**	.50	.04	.21	.12	.02	.03	-.02	-.02	-.18
2. MBP	.34**	1	.46**	.60	-.11	.15	.17	.17	.12	.08	.03	.07
3. RT	.49**	.46**	1	.65	-.23*	.29*	-.15	-.22	-.24*	.13	.13	-.11
T.Score	.66**	.46**	.68**		-.13	.26*	-.06	-.15	-.25*	.18	.17	-.08

*Note: SA – self-awareness, MBP – Moral and balanced processing, RT – relational transparency, UOD – unacceptability of deception, IRT – intimate risk taking, MHI – 38 – Mental Health Inventory-38, A- Anxiety, D – Depression, LC – Loss of behavioral/emotional control, GPA – General positive affect, ET – Emotional ties, LS- Life satisfaction, ** p<.01, * p<.05*

The results show that there exists a statistically significant positive zero-order correlation between the three factors of authentic leadership – Self-awareness, Moral and Balanced Processing, and Relational Transparency (r

ranges from .34 to .49), which confirms the discriminant validity of ALQ. All three factors are positively correlated with the overall score (r ranges from .46 to .68), which confirms the correlation between the factors recognized by CFA. Regarding convergent validity, the results show that the factor Relational Transparency is negatively correlated with the subscale Unacceptability of Deception ($r = -.23$, $p < .05$), positively correlated with the subscale Intimate Risk Taking ($r = .29$, $p < .05$), and negatively correlated with Loss of Behavioral/Emotional Control, one of the subscales of Psychological Distress ($r = -.24$, $p < .05$). ALQ is positively correlated with the subscale Intimate Risk Taking ($r = .26$, $p < .05$) and negatively correlated with Loss of Behavioral/Emotional Control, one of the subscales of Psychological Distress ($r = -.25$, $p < .05$). The results confirm the convergent validity of ALQ. However, the lack of statistically significant correlations between the other measures of authentic leadership and external criteria could suggest that the subscales Self-awareness and Moral and Balanced Processing are adaptive, whereas Relational Transparency is a maladaptive aspect of authentic leadership.

Predictive validity

Table 4 provides coefficients of determination and F statistics from multiple regression analyses for predicting authenticity in relationships and mental health.

Table 4. Predictive validity of Authentic Leadership Questionnaire (ALQ)

Criteria	Authentic leadership questionnaire	
	R^2	F
UD	.018	1.402 (1, 75)
IRT	.067*	5.402 (1, 75)
PD	.024	1.82 (1,75)
PW	.032	2.48 (1, 75)

Note: UD– unacceptability of deception, IRT – intimate risk taking, PD- Psychological distress, PW – Psychological wellbeing, * $p < .05$

The linear regression model has shown that ALQ predicts an authentic leader's tendency to take risks in relationships with other people, which confirms the predictive validity of the questionnaire.

DISCUSSION

The main goal of this pilot research was the empirical validation of the Serbian translation of ALQ on a sample of working students (N = 77), who were given the task of evaluating their immediate superiors. The average age of respondents was AS = 30.06, and their average length of service was AS = 5 years.

Construct validity of ALQ was tested by confirmatory factor analysis. Several models were tested, all chosen on the basis of previous research and the theoretical expectations of the authors of the original scale (Walumbwa et al., 2008). Adaptations of the original Authentic Leadership Questionnaire (Du Plessis, 2014; Dimovski et al., 2013; Rego et al., 2012; Moriano et al., 2011), used in countries where English is not the first language of respondents – South African Republic, Slovenia, France, Italy – revealed problems in the factor structure of the scale. This research has shown that the scale structure is best described by a 4-factor model with a satisfactory model fit. In this research, this model was defined through three intercorrelated factors (Self-awareness, Relational transparency, and the new factor consisting of Internalized moral perspective and Balanced processing from the original ALQ, called Moral and balanced processing) and one general factor of authentic leadership, which can explain the conceptual and empirical overlapping of the factors (Walumbwa et al., 2010). A possible reason for this result could be the gender structure of the sample or of the evaluated superiors. Some researchers (Eagly, Johannesen-Schmidt, and van Engen, 2003) found that women leaders were less hierarchical, more cooperative and collaborative, and more willing to enhance the self-esteem of others than male leaders. These findings confirm that women are likely to fare better with more ease in authentic leadership styles. There were 73% female participants in our study.

Reliabilities of the total score (α = .72), the subscales Relational transparency (α = .65) and Moral and balanced processing (α = .60) are acceptable, whereas the reliability of the subscale Self-awareness is below the acceptable level (α = .50). The reason for such results may be found in the inappropriateness of certain items on the Self-awareness subscale to the social and cultural characteristics of the Serbian sample and the expectations Serbian employees have of their leaders. The basic characteristics of Serbian leaders, as seen by their employees, are greed, unscrupulousness, and manipulativeness, whereas honesty, i.e., authenticity, comes last in this list (Ajduković, 2007).

This research has shown that ALQ has good discriminant, convergent, and predictive validity. The results show that between the three factors of authentic leadership (Self-awareness, Relational transparency, and Moral and

balanced processing) there exists a statistically significant positive zero-order correlation (r ranges from .34 to .49), which confirms the discriminant validity of ALQ. Convergent validity of ALQ is shown by the result that Relational transparency is in negative correlation with the subscale Unacceptability of deception in relationships ($r = -.23$, $p < .05$), which implies that the respondents interpret transparency in workplace relationships as presenting one's true self and being ready for an honest exchange of emotions and thoughts in interpersonal relations, i.e., authentic relationships. The same factor is in positive correlation with the subscale Intimate risk taking in relationships ($r = .29$, $p < .05$) and in negative correlation with Loss of behavioral/emotional control, a subscale of Psychological distress ($r = -.24$, $p < .05$), which implies that relational transparency also involves willingness to take risks, i.e., a wish to achieve security and trust in interpersonal relations while maintaining stability and control over one's own behavior and emotions. The results are consistent with the definition of relational transparency used by the authors of the scale. This definition implies openly sharing information and expressions of one's true thoughts and feelings while trying to minimize displays of inappropriate emotions (Kernis, 2003). Still, a reason for such results in emphasizing the significance of relationships with leaders may also lie in the fact that most respondents were female (73%) and that perhaps most of the evaluated superiors were female. ALQ is in negative correlation with Loss of behavioral/emotional control, a subscale of Psychological distress ($r = -.25$, $p < .05$), and in positive correlation with the subscale Intimate risk taking ($r = .26$, $p < .05$), which shows that the respondents expect their leaders to be open and honest with others. Since in our culture the central criterion of success is possession of power reflected in relations with significant others, our leaders are untrusting and cautious in relations (Glomazić, 2011), which is also confirmed by the results of convergent validity of ALQ. The resulting lack of correlation of ALQ with the scale of Psychological wellbeing did not confirm previous research (Kernis & Goldman, 2005) but could suggest that subscales Self-awareness and Moral and balanced processing are adaptive aspects of authentic leadership, while Relational transparency is a maladaptive aspect of authentic leadership. An authentic leader's tendency to have open and honest relations with other people was also confirmed by a linear regression model, which confirmed the predictive validity of ALQ.

This pilot research showed that the most significant problems of the Serbian translation of the Authentic Leadership Questionnaire (ALQ) are the low reliability of the subscale Self-awareness and the latent structure being different from the original one (Walumbwa et al., 2008), which may be caused by different factors. One factor could be the peculiarity of the sample, reflected in the small range of average age and length of service, but also the fact that the majority of respondents were female. The second factor could, of course,

be poor accuracy of the translation; there was a clear tendency to stay as close as possible to the original expressions in the instrument. There is also the possibility that the content of some items implies a meaning different from the original one.

CONCLUSION

This paper presents the results of empirical validation of the Serbian translation of the Authentic Leadership Questionnaire (ALQ), conducted in order to enable successful application of the questionnaire on the domestic population of employed individuals.

The results of the research showed that the Serbian translation of the Authentic Leadership Questionnaire (ALQ) somewhat reflects the characteristics of translations from English into other languages conducted so far (Datta, 2015; Dimovski et al., 2013). However, the high positive correlation of the instrument's subscales and the high, but not complete, similarity of the latent structure with the scales translated into other languages lead to the conclusion that the Serbian translation of the ALQ can be used only with necessary precaution. This is mostly due to the very low internal consistency of the subscale Self-awareness and the imprecise latent structure of the theoretically presupposed subscales Moral perspective and Balanced processing, which formed a new factor in CFA. Reasons for such results can be found in peculiarities of the small and specific sample, characteristics of the sample (age, gender, length of service), but also in possible distancing from the central subject of measurement during the translation process. This leads to the conclusion that, when translating this or any other instrument, it is very important to preserve the meaning of each item and to be very careful about whether certain items operationalize the construct they are supposed to be measuring on the domestic sample equally well. The question of whether this result is a consequence of an inaccurate or overly literal translation, or perhaps a reflection of the peculiarity of the Serbian population of employed individuals in relation to their expectations of their leaders, can be considered a guideline for future research that will further develop the Authentic Leadership Questionnaire (ALQ).

The general conclusion is that this instrument possesses sufficient qualities to merit more frequent application in domestic research practice. However, before a final version of the Serbian translation of ALQ can be defined, it is necessary that future research addresses the flaws of this translation: using a more representative sample of the domestic population of employed individuals to explore the latent structure in relation to gender, age,

and length of service of respondents, and analyzing cultural and social peculiarities in leadership among the domestic employed population more precisely. Only then can we have reliable data on the exact measurement qualities of the Serbian translation of the Authentic Leadership Questionnaire (ALQ).

REZIME
EMPIRIJSKA VALIDACIJA UPITNIKA AUTENTIČNOG LIDERSTVA (ALQ) NA SRPSKOM JEZIKU

U ovoj pilot studiji testirana je validnost srpskog prevoda Upitnika autentičnog liderstva (ALQ - Avolio, Gardner i Walumbwa, 2007). Studija je sprovedena na uzorku od 77 zaposlenih studenata koji su procenjivali svog neposrednog nadređenog. Validnost upitnika ALQ i podskala (Samoposmatranje, Unutrašnja moralna perspektiva, Uravnotežena obrada informacija i Relaciona transparentnost) ispitivana je kroz pouzdanost, konstruktnu, divergentnu, konvergentnu i prediktivnu validnost.
Rezultati sugerišu da je ALQ na srpskom jeziku dovoljno kvalitetan instrument za upotrebu u domaćoj istraživačkoj praksi, ali ga je potrebno koristiti sa neophodnim oprezom zbog specifičnosti srpske populacije zaposlenih u odnosu na njihova očekivanja od lidera.
Upitnik autentičnog liderstva (ALQ) na srpskom jeziku zahteva dalji razvoj.

Ključne reči: ALQ, autentičnost, liderstvo, srpski

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Ovaj rad je primljen **21.11.2025,** a na sastanku redakcije časopisa prihvaćen za štampu **23.12.2025.** godine.

UDK: 658.8

Original Scientific Article

POSLOVNA EKONOMIJA
BUSINESS ECONOMICS
Godina XIX
Broj 2
Str: 33 – 54
DOI: 10.5937/poseko28-64556

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DOMESTIC OR FOREIGN? THE RELATIONSHIP BETWEEN NATIONAL IDENTITY AND BRAND CHOICE AMONG SERBIAN CONSUMERS

ABSTRACT: This study examines how Serbian consumers relate to the "Made in Serbia" label and whether this influences their choice of domestic brands. My focus was on how much national origin matters in consumer decisions today. Another important question was whether choices are driven by emotional attachment or rational consideration.

The online survey received 294 valid responses, primarily from urban consumers of working age. According to the results, the "Made in Serbia" label is associated with a fundamentally positive attitude, but support is conditional: most people choose domestic products if they are competitive in terms of quality and price. Older respondents generally have a stronger attachment to domestic origin, while younger respondents tend to be more influenced by practical considerations.

Overall, the study shows that domestic origin is not a decisive factor in itself, but it is an important basis for trust. The "Made in Serbia" label can become a real advantage if the product behind it is reliable, modern, and authentic; in other words, if it is not only domestic but also of good quality.

Keywords: brand, consumers behavior, consumers' attitudes

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INTRODUCTION

When a shopper stands in front of a shelf in a store, they often consider not only which product is cheaper or better known, but also where it comes from. The "Made in" label often says more than just the origin of a product, as it also conveys feelings, memories, and trust. In the age of globalization, attachment to domestic products takes on special significance.

In Serbia, this issue is even more pronounced, as national identity is deeply embedded in the social consciousness. Nevertheless, consumer decisions are increasingly made on a rational basis: shoppers want to buy not only "domestic" products, but also good ones. This duality, the coexistence of emotional loyalty and conscious consideration, is one of the most important starting points for the research.

Similar patterns can be observed in other areas of the economy. Research on women's participation in tourism management (Kőmüves et al., 2025) showed that regional inclusivity and gender diversity correlate positively with innovation and performance outcomes. This confirms that identity-related factors, whether gender or national origin, shape trust and engagement not only in organizations but also in consumer behavior.

The aim of the study was to find out what the "Made in Serbia" label means to consumers today. Does this label inspire pride, or does it come across as neutral information? Does age or gender influence someone's choice of domestic brands? And perhaps most importantly, does this positive attitude actually translate into purchasing decisions, or does it remain merely theoretical support?

The research sought answers to these questions using an online questionnaire that collected the opinions of nearly 300 Serbian consumers. By analyzing the data, I sought to uncover not only the structure of attitudes, but also their driving forces, i.e., when and why a consumer feels confidence in domestic origin. The goal was not only to present statistical correlations, but also to understand how national origin can be made part of modern, conscious consumer thinking.

LITERATURE REVIEW

Domestic or foreign? The relationship between national identity and brand choice among Serbian consumers

Globalization has a dual effect on consumer decisions (Tidake et al., 2025, Neugebauer, & Vokoun, 2024): while markets and cultures are becoming more homogeneous, localization is strengthening the expression of

national and regional identity (Oomen et al., 2021). Consumption is thus not only an economic act but also an identity-forming one, in which both alignment with global trends and expression of local belonging are manifested.

National identity is a key factor in consumer behavior (Toha, & Supriyanto, 2023).These identity-driven mechanisms are also evident in workplace contexts. A study on generational motivation in the food industry (Kőmüves et al., 2022) found that younger cohorts (Y and Z) display weaker long-term loyalty and lower commitment to collective goals. This generational shift toward individualistic values parallels consumer tendencies to prioritize quality and design over national identity when making purchasing decisions.

According to Małecka A. and Pfajfar G. (2025), consumers in globalized markets reinterpret their own cultural situation (Sakshi, & Kishor, 2024), while He et al. (2021) have shown that a strong national identity increases the preference for domestic brands. Based on the above, it is likely that decisions are also symbolic value carriers to some extent.

Glocalization, or the adaptation of global brands to local meaning systems, is particularly characteristic of Central and Southeastern Europe (Bas, 2025; Tidake et al., 2025), where cultural hybridization has led to the intertwining of Western lifestyles and local symbolism (Wang, 2022). Consumers in the region strive for modernization and the preservation of national characteristics at the same time, resulting in an ambivalent attitude towards foreign brands.

National loyalty and patriotism become part of the economic self-image (Serrano-Arcos et al., 2022), and purchasing domestic products is often a moral act (Roy et al., 2023; Wilke, 2021) that strengthens economic self-determination and collective identity. Based on my own experience, I believe that Serbian consumers support domestic brands when they are competitive with global alternatives in terms of quality and communication.

From the theoretical background on the relationship between globalization and national identity (Zajda, 2022) logically follows the concept of consumer ethnocentrism, which is one of the most important psychological bases for the preference for domestic products. Consumer ethnocentrism is one of the critical variables that influence consumers' decisions to purchase foreign products (Trivedi et al., 2023). Sumner (1906) identified the first traces of ethnocentrism. According to him, ethnocentrism is "a vision of things in which one's own group is at the center of everything, and everything else is measured and evaluated accordingly" (Sumner, 1906, p. 13). Later, Shimp and Sharma (1987) applied the concept to consumers, calling it consumer ethnocentrism (CE). They are the pioneers of this concept and created a scale called CETSCALE to measure it. CE "indicates the general tendency of buyers to avoid all imported products for nationalistic reasons, regardless of their price or quality" (Shankarmahesh, 2006, p. 147). According to the model,

ethnocentric consumers believe that buying domestic products is an economic and moral obligation, while choosing imported products can be considered a betrayal of the national community. Ethnocentric consumers often feel unpatriotic when buying foreign products because they believe that this weakens the local economy. For them, imported goods pose not only an economic threat but also a cultural one (Cleveland et al., 2009). However, these trends are not uniform everywhere: according to Balabanis and Diamantopoulos (2004), ethnocentrism is generally weaker in developing countries, as consumers tend to find foreign brands more attractive. Consumer habits are constantly changing, and in globalized markets, it is becoming increasingly challenging for marketers to get their products accepted by international buyers.

The degree of ethnocentrism varies significantly depending on the socio-economic context. In developed economies, it tends to manifest itself as symbolic, cultural loyalty, while in post-socialist countries such as Serbia, it often takes the form of economic self-defense and national reconstruction. Here, buying domestic products is often a symbolic act of supporting job creation, self-determination, and national pride (e.g., Gašević et al., 2017). Rakic et al. (2019) emphasize in their study that great emphasis should be placed on encouraging ethnocentrism because it can have several benefits: first, consumer behavior influences corporate profits and thus Serbia's gross domestic product; second, it can also influence consumer awareness of ethnocentric consumption.

Based on the above, consumer ethnocentrism forms a bridge between global modernity and local loyalty (Sorrentino et al., 2024) and provides a key theoretical framework for understanding the support of domestic brands.

Country-of-origin (COO) effect and the role of "Made in" labels

The effect of a product's country of origin attracted the interest of researchers as early as the 1960s and has remained one of the most studied factors in consumer behavior research ever since. Numerous studies have examined how the origin of a product influences consumers' perceptions, preferences, and decisions when making purchases (Samiee et al., 2024; Mohit et al., 2025; Rodrigo et al., 2023; Nguyen & Alcantara, 2022). According to previous studies, the way people think about their own country (Laroche et al., 2005) reveals a lot about the extent to which their economic environment determines their product choices (Zeugner-Roth & Diamantopoulos, 2010). The country-of-origin effect essentially describes how a nation's image shapes consumers' attitudes toward products and brands and how this translates into actual purchasing behavior (Abdelwahab et al., 2022). Decisions are often based not on rational considerations but on associations and impressions:

consumer confidence is strongly influenced by what they think about a given country's culture, level of development, or lifestyle. These underlying images and feelings often unconsciously influence which products are considered authentic and worth buying.

In Serbia, the "Made in Serbia" label has special significance. For some consumers, it is not just a designation of origin but also a symbol of economic independence and support for domestic labor. As research by Gašević et al. (2017) has shown, Serbian consumers feel a stronger connection to brands that convey local values and national pride. The label has both a practical and an identity-forming function. On the one hand, it refers to quality, and on the other, it carries a moral message of supporting domestic products. According to Rakić et al. (2019), communicating domestic origin not only reinforces consumer ethnocentrism but also creates new forms of economic patriotism. This attitude is particularly strong in the food industry and among small business brands, where the "Made in Serbia" label has become a symbol of authenticity and social responsibility.

Based on the above, I believe that the COO effect in Serbia not only influences quality perception but is also an important tool for expressing national identity. Today, the "Made in Serbia" label not only tells us where the product was made but also who we are when we choose it.

Nation branding and place identity

Over the past two decades, the concept of nation branding has become an important tool for economic competitiveness and cultural self-image (Christopher, 2015; Mikecz, 2019). According to Jaworski (2013), a national brand is a consciously shaped representation of a country's identity that influences how the outside world perceives that country. Vaara et al. (2021) add that national image is a political, economic, and cultural construct of the nation's self-image and its communication in the global space.

One of the most important functions of nation branding is to shape consumer perceptions not only of the country but also of the products manufactured there (Vecchi, 2021). The rapid development of the global market has prompted consumers to take into account a new external information signal, namely the country-of-origin label (Gineikiene et al., 2016; Hu and Wang, 2010; Laforet and Chen, 2012). A positive country image builds trust in the "Made in" label, while an unfavorable national reputation often hinders the export and market acceptance of local products. In Serbia, the "Made in Serbia" label has gradually become part of the national image. The range of products labeled "Made in Serbia" is surprisingly wide and reflects the diversity of the country's economy and the coexistence of local traditions and modern industries. The advantage of "Made in Serbia" products is that they

strengthen the country economically, provide social stability and identity, are more environmentally sustainable, and build consumer confidence. These products are not just commodities but symbols of local value creation and national pride.

According to the theory of place identity (Hankinson, 2009), places, like brands, become lovable and credible through stories, values, and symbolic meanings. Let us look at some specific examples. The town of Leskovac, for example, is known for its grilled foods and ajvar. Leskovački roštilj (Leskovac grill) and local ajvar producers (e.g., Bakina Tajna, Granny's Secret) build the city's reputation on its gastronomic heritage. The identity of the place is thus organized around artisanal, community-based food culture. The Bambi factory operates in the city of Požarevac, and its iconic product, Plazma biscuits, has become a national symbol. The brand's communication deliberately builds on childhood memories, family warmth, and trust, which are deeply rooted in Serbian culture. Last but not least, Jelen beer, which is brewed in the Apatin brewery and is linked to the place (Apatinska pivara) in its name, is also worth mentioning. The image of the beer evokes Serbian nature, wildness, and masculine pride, symbolized by the deer head that has become its emblem.

Place identity is clearly observable in Serbian brands. Local origin, cultural heritage, and modernity together shape an image in which "Made in Serbia" is not only an economic category but also a visual and emotional expression of national identity.

MATERIAL AND METHODOLOGY

The aim of the research was to explore the factors that shape consumers' attitudes towards the "Made in Serbia" label and how this attitude influences their choice of domestic brands. The study was based on measuring consumer attitudes, exploring their structural characteristics, and interpreting demographic influences.

Research design and approach

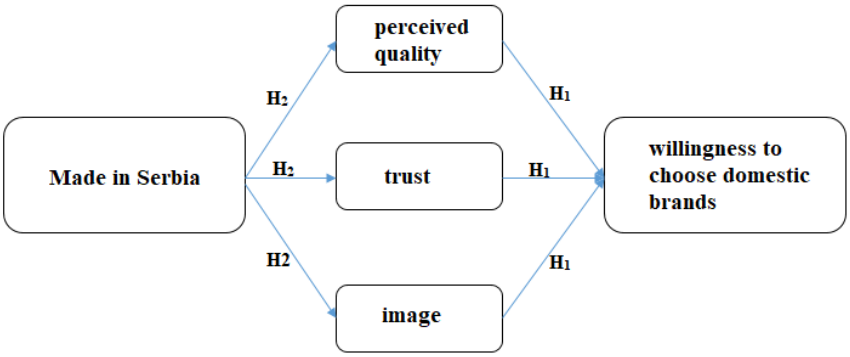
The research was conducted using a quantitative methodology in the form of an online questionnaire. Its aim was to quantitatively analyze attitudes toward the "Made in Serbia" label and to use statistical tools to reveal the underlying patterns. The questionnaire contained closed questions, statements rated on a five-point Likert scale, and basic demographic questions.

The research was descriptive and explanatory in nature: the descriptive part examined the general attitudes of respondents, while the explanatory analyses interpreted the effects of background variables such as age, gender, and educational attainment.

The theoretical model of the research

Based on the literature presented in the previous chapters, the aim of the research is to explore how attitudes related to national identity influence consumer decision-making. The model (Figure 1) is based on the assumption that emotional and rational attitudes toward the "Made in Serbia" label indirectly influence the choice of domestic brands through perceptual factors such as perceived quality, trust, and image.

Figure 1. The theoretical model of the research



Source: Author

The model therefore examines not only the direct relationship between attitude and willingness to buy, but also how national attachment is transformed into consumer experience and decision-making. The theoretical basis of the concept is provided by research findings on the country-of-origin effect and consumer ethnocentrism, according to which the origin of a product influences consumer perception on both an emotional and a cognitive level.

Based on this, the research tests two hypotheses: (1) consumers more often choose foreign brands in their purchasing decisions (H1), and (2) they find foreign products more attractive than domestic ones (H2). The model presents the relationship between these factors, illustrating the interaction between national attitude, perception, and decision-making behavior.

Sample and data collection

Data collection was carried out in 2024 using a self-administered online questionnaire. A total of 294 valid responses were received and analyzed. Although the sample is not representative of the entire Serbian population, it was diverse in terms of age, gender, and educational attainment, which made it possible to examine differences in attitudes among different groups.

The majority of respondents were urban, working-age consumers who regularly purchase both domestic and foreign products. This target group is

particularly relevant, as they are the ones who actually shape the market position of domestic brands through their everyday decisions.

Measuring instruments and variables

To measure attitudes towards "Made in Serbia," I developed an eight-item scale that examined both the emotional and rational attitudes of respondents. The scale covered dimensions such as trust, perceived quality, brand image, and price competitiveness. The statements were rated on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree).

The questionnaire also included an index measuring willingness to choose**,** which showed whether respondents preferred domestic or foreign brands. Demographic variables included age, gender, educational attainment, and type of residence**.**

I checked the reliability of the scale using Cronbach's alpha, while I examined its internal structural validity using exploratory factor analysis (EFA).

Statistical methods used

The research combined several statistical methods, depending on the nature of the research questions.

- Descriptive statistics was used to present the general attitudes of the respondents using means, standard deviations, and frequencies.
- Reliability testing (Cronbach's alpha) was used to assess the internal consistency of the scale.
- Factor analysis was used to explore the underlying dimensions of the "Made in Serbia" attitude index, using Varimax rotation.
- Spearman's rank correlation was used to explore monotonic relationships between non-normally distributed data (e.g., attitude and willingness to vote, and age).
- Mann-Whitney U test was used to examine gender differences in independent samples.
- The analyses were performed using a combination of SPSS and Python (pandas, pingouin, factor_analyzer) software.

RESULTS

When examining attitudes toward the "Made in Serbia" label, I used an eight-item scale that measured respondents' attitudes toward domestic brands. The first analysis showed that the Cronbach's alpha value of the scale was only 0.60, which indicates only moderate reliability in terms of internal consistency. The result suggested that there was at least one item that did not fit well with the construct or carried a different meaning.

In scientific practice, an alpha value of 0.7 is considered the minimum threshold for reliability, so refinement of the scale was warranted. To this end, I performed an item analysis that examined two key indicators:

- the item–total correlation (how much an item correlates with the other items on the scale), and
- the "alpha if item deleted" value (how the alpha would change if the item in question were removed).

The results of the item analysis are shown in Table 1

Table 1. Item analysis of the “Made in Serbia” attitude scale: item–total correlations, Cronbach’s alpha if item deleted, and interpretation

Item abbreviation	**Item–total correlation**	**Alpha if deleted**	**Interpretation**
"Foreign brands have a stronger image than Serbian brands."	–0.30	0.69	Contradictory, distorting item
“I would prefer to choose a domestic brand if it offered a similar standard to foreign brands.”	0.32	0.56	Weakly but positively related
"I would prefer to buy a domestic brand if I were sure of its quality."	0.41	0.53	Well-fitting item
"I would prefer to choose a domestic brand if it were cheaper than foreign brands."	0.38	0.53	Correct additional condition
"I think it is important that more competitive and attractive Serbian brands appear on the market."	0.50	0.51	Strongest fit
"I would be more inclined to buy domestic products if they had stronger,	0.34	0.55	Medium-strength item, image dimension

more recognizable brands."			
"How convincing/attractive do you find the 'Made in Serbia' label?"	0.36	0.54	Stable, central item

Based on the analysis, it became clear that the statement regarding foreign image continued to weaken the scale, as respondents reacted to this item from a different attitude perspective. After omitting the item (Table 2), the reliability of the scale increased to 0.69, thus approaching the value of 0.70 accepted in scientific publications.

Table 2. Statistical characteristics of the refined 7-item scale

Indicator	**Value**	**Interpretation**
Number of items	7	Uniform construction
Cronbach's alpha	**0.69**	Acceptable internal consistency
Sample (N)	29	Reliable number of items
Average	3.72	Slightly positive attitude
Standard deviation	0.61	Moderate dispersion

Based on the results obtained, the indicators of the 7-item "Made in Serbia" attitude index suggest that the scale measures respondents' attitudes towards domestic brands in a reliable but not overly homogeneous manner. The Cronbach's alpha value of 0.69 is at the lower end of the acceptable range, which means that the questions point in one direction, but each adds a different aspect to the attitude towards domestic products (e.g., the importance of price, quality, or brand strength). The average value of 3.72 indicates a slightly positive attitude: consumers are basically open to products labeled "Made in Serbia," but they base their decisions on rational criteria. The standard deviation of 0.61 indicates a moderate dispersion of opinions, meaning that the majority think similarly, but there are also differing opinions in smaller groups. The sample of 294 people is large enough for these results to be statistically reliable. Overall, the scale shows that support for domestic brands among respondents is not rejected but conditionally positive, which is a good starting point for the positioning and marketing communication of domestic products.

I grouped the distribution of the attitude index (Table 3) based on the average values of the 7-item scale in order to make it clear what proportion of

respondents have a positive, neutral, or negative attitude toward the "Made in Serbia" label.

Table 3: Distribution of the attitude index

Value range	**Number of respondents**	**Proportion**
1.0–2.0 (negative attitude)	4	1
2.01–3.0 (neutral)	39	13
3.01–4.0 (moderately positive)	166	56
4.01–5.0 (strong positive)	84	29

The results show that the vast majority of respondents – around 85% – have a neutral or positive attitude, meaning that they are fundamentally favorable towards domestically produced products. The largest group (56%) consists of respondents with a moderately positive attitude, while 29% expressed a strongly positive attitude. In contrast, only 1% of the sample had a negative attitude, indicating that rejection of domestic brands is socially marginal. The distribution therefore clearly reflects openness to domestic origin, but also suggests that this openness is conditional: consumers' positive attitude is strengthened when domestic products are competitive in terms of quality and price.

After refining the scale, the next step was to examine the internal structure of the "Made in Serbia" attitude index. The aim was to understand whether the seven items actually measure a single, unified attitude dimension, or whether there are several distinct perspectives behind them. I therefore used factor analysis to explore the structure of the relationships between the items and to determine what hidden dimensions might explain the patterns in the respondents' answers. Prior to the analysis, I checked whether the data were suitable for the method: I used the Kaiser–Meyer–Olkin (KMO) index to examine the adequacy of the sampling and Bartlett's test to examine the significance of the correlations between the items. I then performed exploratory factor analysis (EFA) with Varimax rotation, which allows for the identification of well-separated factors and the verification of the structural validity of the scale.

The results of the factor analysis (Table 4) showed that the "Made in Serbia" attitude index forms a well-interpretable and reliable structure. The KMO index value is 0.709, which indicates that the correlation between the seven questions is strong enough to produce meaningful results. Bartlett's test was also significant ($\chi^2(21) = 488.58$, $p < 0.001$), meaning that there is a real,

non-random relationship between the responses, which confirms that the factor analysis was justified.

During the analysis, I examined how many different mindsets or attitude types lie behind the responses. The results show two main factors that summarize the attitudes of the respondents. The first explains about 38 percent of the total variance, and the second explains another 22 percent—together, they account for more than half of the responses. In other words, the attitudes of the respondents are organized along two basic lines.

One factor is "conditional domestic preference," which is the attitude of choosing a domestic brand when it is competitive in terms of quality, price, or brand image. Another factor is the direct perception of the "Made in Serbia" label, which is more emotional and symbolic in nature – it shows how attractive or convincing respondents find the label.

Based on the results, domestic origin is a positive value in itself, but it is not the only factor determining consumer decisions. Consumers support domestic products if they meet their expectations in terms of quality and price, meaning that rationality plays an important role alongside national attachment. Therefore, "Made in Serbia" represents a real market advantage if domestic products are competitive not only in terms of their origin but also in terms of their performance.

Table 4. Summary of factor analysis results

Indicator	Value	Interpretation
KMO indicator	0.709	Good sampling suitability
Bartlett's test	$\chi^2(21)=488.58$; $p<0.001$	Correlations are significant
Variance explained by factor 1	38.4	Conditional domestic preference
Variance explained by factor 2	22.0	Direct assessment ('Made in Serbia' label)
Total explained variance	60.4	Two factors describe the attitude structure well

After ensuring that the scale reliably and structurally validly measures the attitude under investigation, the next step was to actually test the hypotheses. My goal was to find out to what extent the attitude associated with the 'Made in Serbia' label influences consumer decisions and what role basic demographic factors such as age and gender play in this.

The attitude index, consisting of seven statements, developed as a result of previous analyses, reliably reflects how respondents relate to domestic

brands. This allowed me to use the index to retest the hypotheses. The first hypothesis (H1) sought to answer whether a positive attitude toward the "Made in Serbia" label increases the likelihood of choosing domestic brands. The second hypothesis (H2) examined whether age and gender influence this attitude, i.e., whether different groups think differently about the importance of domestic origin.

The aim of these analyses was to better understand what lies behind the support for domestic products: is it more of an emotional attachment, conscious consideration, or some kind of demographic characteristic? In the following subchapters, I will present the steps and results of the examination of the two hypotheses in detail.

H1 – The relationship between attitude and willingness to choose domestic brands

The first hypothesis (H1) was based on the assumption that those who have a more positive attitude towards the "Made in Serbia" label are more likely to choose domestic brands. For the study, I used a previously developed seven-item attitude index that reflected the respondents' general attitude towards domestic products. I compared this with the choice indicator calculated on the basis of question block 17, which showed whether respondents preferred domestic or foreign brands (Table 5).

Since the distribution of the variables was not completely normal, I used Spearman's rank correlation method, which is useful even when the data do not follow each other linearly, but only in direction. The result of the analysis was $\rho = 0.136$; $p = 0.019$ ($N = 292$), which indicates a weak but significant positive relationship between attitude and willingness to choose domestic products. In other words, the more favorably someone views the "Made in Serbia" label, the more likely they are to choose a domestic brand, even if this effect is not strong.

The results suggest that a positive attitude alone is not enough, but it does contribute to a preference for domestic products. Decisions are influenced not only by emotional attachment, but also by rational considerations such as price, quality, or brand awareness. This means that the "Made in Serbia" label is a good starting point for building customer loyalty, but it alone does not guarantee the success of domestic brands. To strengthen consumer confidence, communication must also emphasize quality, reliability, and authenticity.

Table 5. Relationship between attitude index and willingness to choose domestic brands (H1)

Indicator	Value	Interpretation
N	29	Number of valid responses
Spearman's ρ	0.136	Weak but positive correlation
p-value	0.019	Significant ($p < 0.05$)
Interpretation		A positive attitude increases the likelihood of choosing domestic products

Hypothesis H1 was therefore confirmed**,** as there was a statistically significant correlation between the "Made in Serbia" attitude index and the choice of domestic products. Although the correlation is not strong, it still indicates a clear direction: a positive attitude shifts consumer preferences towards domestic brands. This is an important message for domestic manufacturers, for whom communication based on national origin, but focused on quality, can be an effective tool for strengthening loyalty.

H2 – The effect of age and gender on the perception of the “Made in Serbia” label

The second hypothesis (H2) examined whether age and gender influence how positively people view the "Made in Serbia" label (Table 6).

I examined the relationship between age and the "Made in Serbia" attitude index using Spearman's rank correlation. The result was $\rho = 0.191$; $p < 0.001$ ($N = 294$), which shows a weak but clearly significant positive relationship. Based on this, it can be said that older respondents have a slightly more favorable attitude towards domestically produced products than younger respondents. Thus, with advancing age, the kind of trust and emotional attachment that sees the "Made in Serbia" label as authentic and valuable grows stronger.

I checked for gender differences using the Mann–Whitney U test. The result was U = 12,180; $p = 0.058$, which is close to the significance threshold. This means that women have a slightly more positive attitude towards domestic brands, but the difference is not strong enough to be considered statistically significant. The trend is therefore noticeable but not pronounced.

Table 6. The effect of age and gender on attitudes toward the “Made in Serbia” label

Variable examined	Method	Result	p-value	Interpretation
Age × Attitude index	Spearman correlation	ρ = 0.191	< 0.001	Older people have a more positive attitude towards domestic origin
Gender × Attitude index	Mann–Whitney U test	U = 12,180	0.05	The difference is not significant, women are slightly more positive

Based on the above, hypothesis H2 has been partially confirmed**.** Age does indeed have an impact on the perception of “Made in Serbia”, but gender does not. It seems that trust in domestic origin is linked more to generational experiences than to gender differences. Older consumers are likely to identify more strongly with the idea and economic significance of domestic production, while younger consumers' decisions are much more influenced by practical factors such as price, design, or trendiness.

INTERPRETATION OF THE RESULTS OF THE HYPOTHESIS TESTS

The aim of the research was to better understand how consumers relate to the *"Made in Serbia"* label and how this attitude influences their choice of brands. The results clearly show that there is trust in domestic origin, but it is not self-evident. Consumers today make much more conscious decisions: they support domestic products, but only if they are competitive in terms of quality and price.

The first hypothesis (H1) assumed that a positive attitude increases the likelihood of choosing domestic brands – and this was indeed confirmed. Although the relationship is not strong, it is clear that those who have a favorable attitude towards the *"Made in Serbia"* label are more likely to choose domestic products. At the same time, many other factors influence the decision: quality, price, design, or even brand awareness. This shows that

national loyalty still matters today, but it is not enough on its own; consumers expect domestic products to not only be domestic, but also to be of good quality.

The second hypothesis (H2) was partially confirmed. Age has a certain influence on attitude: older respondents generally have a more positive view of domestic origin, while younger respondents tend to favor practical and trendy aspects. However, there is little difference between the sexes; women are slightly more favorable towards domestic brands, but the difference is not significant. Based on this, the perception of *"Made in Serbia"* is more a generational issue than a gender issue. For older people, national pride and the idea of self-sufficiency are even more important, while younger people pay attention to design, price, and modern appearance.

The results of the two hypotheses together suggest that the *"Made in Serbia"* label is more than just a marketing message; it is a real, but conditional, value in the eyes of consumers. Loyalty lasts as long as the product actually meets expectations: it is of good quality, authentic, and modern.

Overall, the model established in the research accurately describes how national identity, consumer perception, and decision-making are linked. H1 showed that a positive attitude increases the choice of domestic brands, while H2 highlighted that the appeal of foreign products is often rooted in the areas of perceived quality, trust, and image. These factors play a mediating role between attitude and actual decision.

Ultimately, national identity still influences consumer preferences today, but more at the level of thinking and evaluation than on a purely emotional basis. The model thus not only describes the relationships, but also explains how national attachment translates into purchasing decisions. This warns us that successful domestic brand building must appeal to both emotions and rationality, i.e., to the hearts and minds of consumers.

CONCLUSIONS AND RECOMMENDATIONS

The most important message of the research is that domestic origin is not a decisive factor in itself, but a basis of trust that can be built on—but only if the product itself is strong. The "Made in Serbia" label is therefore not an end goal, but a starting point for consumer loyalty.

The broader pattern emerging from related research indicates that social identity — national, generational, and gender-based — significantly shapes both economic and attitudinal behavior. Earlier findings in tourism management (Kőmüves et al. 2025) and workplace motivation (Kőmüves et

al., 2022) reinforce this conclusion: inclusive and identity-aware strategies enhance trust, loyalty, and performance across sectors.

1. From the consumer's perspective

The majority of respondents are open to domestic brands, but rational considerations play a strong role in their decisions. Domestic origin inspires confidence, but buyers do not choose purely out of patriotism: they expect quality, modernity, and authenticity. This is especially true for younger generations, who respond more to experience and style than to national sentiment.

2. From a corporate perspective

For domestic brands, this result provides a clear direction: it is not enough to be domestic, it must also be apparent that they are worth choosing. The "Made in Serbia" label will only be credible if it is backed by real performance, consistent quality, and transparent communication. Brand image is therefore built not through labeling, but through experience. Communicating domestic origin only works when national identity and modern competitiveness appear together.

3. At the economic policy and social level

The research highlights that the "Made in Serbia" brand has great potential, but a coordinated strategy is needed to unlock it. Consumer confidence could be boosted, for example, by certification systems, "domestic quality" trademarks, educational campaigns, or government incentives for domestic manufacturers. In the long term, national brand building can play a role not only in the economy but also in strengthening identity.

Overall, the research findings suggest that domestic origin is valuable, but authenticity is what makes it sustainable**.** The "Made in Serbia" label can become a real competitive advantage if consumers are not only proud of it, but also believe from experience that it is worth choosing.

Limitations of the research

The results of the study provide valuable guidance, but there are some limitations to consider. The sample is not representative**,** so the results can be interpreted primarily in relation to the respondents, not the entire population. Self-administered data collection may also be distorted by social expectations, which can skew the average attitudes toward domestic products upward. Despite these limitations, the results reliably show the internal patterns and directions of the attitude structure examined.

REZIME
DOMAĆE ILI STRANO? ODNOS IZMEĐU NACIONALNOG IDENTITETA I IZBORA BRENDOVA MEĐU SRPSKIM POTROŠAČIMA

Ova studija ispituje kako se srpski potrošači odnose prema oznaci „Proizvedeno u Srbiji“ i da li to utiče na njihov izbor domaćih brendova. Moj fokus je bio na tome koliko je nacionalno poreklo važno u potrošačkim odlukama danas. Još jedno važno pitanje bilo je da li su izbori vođeni emocionalnom vezanošću ili racionalnim razmatranjem.
Onlajn anketa sadrži 294 validna odgovora, prvenstveno od urbanih potrošača radnog doba. Prema rezultatima, oznaka „Proizvedeno u Srbiji“ povezana je sa fundamentalno pozitivnim stavom, ali je podrška uslovna: većina ljudi bira domaće proizvode ako su konkurentni u pogledu kvaliteta i cene. Stariji ispitanici generalno imaju jaču vezanost za domaće poreklo, dok mlađi ispitanici imaju tendenciju da budu više pod uticajem praktičnih razmatranja.
Generalno, studija pokazuje da domaće poreklo samo po sebi nije odlučujući faktor, ali je važna osnova za poverenje. Oznaka „Proizvedeno u Srbiji“ može postati prava prednost ako je proizvod koji stoji iza nje pouzdan, moderan i autentičan, drugim rečima, ako nije samo domaćeg porekla već i kvalitetan.

Ključne reči: brend, ponašanje potrošača, stavovi potrošača

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Ovaj rad je primljen **27.11.2025,** a na sastanku redakcije časopisa prihvaćen za štampu **23.12.2025.** godine.

UDK: 634.711

Original Scientific Article

POSLOVNA EKONOMIJA
BUSINESS ECONOMICS
Godina XIX
Broj 2
Str: 55 – 65
DOI: 10.5937/poseko28-62323

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ECONOMIC ANALYSIS OF RASPBERRY PRODUCTION IN SERBIA AT THE LEVEL OF VARIABLE COSTS IN 2024

ABSTRACT: Raspberry production in the Republic of Serbia plays a crucial role in the agricultural economy, particularly for small-scale farms in mountainous regions. The Willamette cultivar, being widely cultivated variety, holds dominant economic significance. This study presents an economic analysis of raspberry production based on data collected from 174 selected farms during the 2024 production year. Family labor utilization was estimated based on normative labor requirements for various manual agricultural operations, as determined through consultations with experts from Serbia's agricultural advisory services and relevant literature sources.

The analysis focuses on the structure of variable costs, distinguishing between recorded expenditures and total variable costs inclusive of imputed family labor costs. Results reveal substantial variability in yields, input usage, labor intensity, and market prices, despite favorable agroecological conditions. On average, yields on the selected farms significantly exceeded the national average.

Labor costs—particularly family labor—emerged as the most influential component of total variable costs, accounting for

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approximately 40.35% of the average. When family labor is included, the average gross margin per hectare decreases by 42.8%, underscoring the importance of comprehensive cost accounting. The study highlights the necessity of incorporating family labor valuation in economic assessments to avoid misinterpretation of profitability.

These findings establish a foundation for enhancing advisory practices, refining cost estimation methodologies, and informing policy initiatives aimed at improving the sustainability and competitiveness of raspberry production in Serbia.

Keywords: Willamette cultivar, variable costs, gross margin

INTRODUCTION

Raspberry production in the Republic of Serbia holds significant agronomic and economic importance, particularly for small-scale farms in mountainous and sub-mountainous regions. The Willamette cultivar, characterized by its adaptability and yield potential, dominates Serbian raspberry orchards and serves as the cornerstone of national raspberry exports. Since the mid-1980s, the Willamette raspberry cultivar has maintained a leading role in Serbia's commercial raspberry sector, representing more than 90 % of the total cultivated area (Nikolić et al., 2008; Leposavić, 2023). Willamette proves highly suitable for raspberry cultivation in Serbia thanks to its strong adaptation to regional agroecological conditions, exceptional yield capacity, and outstanding characteristics for freezing and international trade. Given the increasing volatility in input prices, labor availability, and market conditions, a detailed economic analysis of raspberry production is essential for assessing farm-level profitability and informing policy interventions.

The data utilized in this study originate from the institutional database of the Institute for the Application of Science in Agriculture. They were gathered from a targeted sample of farms primarily engaged in raspberry production (hereinafter referred to as "selected farms"), identified in accordance with the Rulebook on the Methodology of Agricultural Advisory Services (Official Gazette No. 65/14). This Rulebook forms an integral component of the Regulation governing the annual development program for agricultural advisory activities, as enacted for each respective calendar year.

This study focuses on the economic performance of selected raspberry farms in Serbia during the 2024 production year, with particular emphasis on variable cost structures. The analysis is based on primary data collected from 174 farms cultivating Willamette raspberries under conventional open-field

conditions. The selected sample encompasses a wide range of farm sizes, production intensities, and marketing strategies, thereby enabling a representative assessment of economic outcomes for farms that apply recommended agrotechnical practices.

The research methodology involves disaggregating variable costs into recorded expenditures and imputed family labor costs. This distinction is critical, as family labor—although often unaccounted for in farm records—represents a substantial share of total production costs and directly influences gross margin calculations. By incorporating normative labor input values and prevailing wage rates, the study provides a more comprehensive and realistic estimate of economic performance. Quantity of total labor in working days per manual operation were estimated to 95 w.day/ha for plantation maintenance, transportaion and other operations and with 50 kg/w.day for fruit harvest, using various sources (Milinković, et.al, 2005; Veljković et al., 2006; Lukić et al., 2015) and author's consultations with experts from State funded advisory services from the cities of Belgrade, Kraljevo, Užice, Valjevo and Čačak.

The findings aim to support producers, researchers, and policymakers in understanding the cost dynamics of raspberry production and in developing strategies to enhance farm profitability, labor efficiency, and long-term sustainability. Through rigorous cost analysis and gross margin evaluation, this research contributes to the broader discourse on horticultural economics and rural development in Serbia.

RESULTS AND DISCUSSION

The analysis was conducted on 174 farms in 2024 cultivating raspberries on a total area of 101.12 ha on selected farms and results varied significantly. The smallest area of raspberry plantations was 15 ares, the largest area was 2.5 ha, with the average weighted size of the plantations being 0.578 ha.

Table 1. Achieved results in 2024 production year

Value / Indicator	Area (ha)	Yield (kg/ha)	Income (€/ha)	Price (€/kg)	Income with incentives (€/ha)
Min	0.15	3000.00	5122.08	1.71	5361.11
Max	2.50	27000.00	57623.36	3.83	57905.07
Average	0.58	10501.45	22402.76	2.13	22561.34

Source: author's calculation

Realized quantities of raspberries produced varied widely with a range of variation of 24000 kg/ha and an average of 10501 kg/ha. The prices at which raspberries were sold also varied greatly between 1.71 €/kg and 3.83 €/kg. Some farmers delivered their products to cold stores at lower prices, while some farms obtained a higher price through retail. The average price at which all the produced raspberries from the selected farms were sold was 2.13 €/kg. The mentioned differences in produced quantities and realized prices caused large differences in income between individual farms. The average realized income per unit of area was 22561 €/ha, in which State subsidies contributed approximately 1 % to total income.

Of the variable costs, the survey recorded the costs of mineral fertilizers and manure, plant protection agencies, diesel fuel, mechanized services, hygiene products, external labor per work operation, as well as other variable costs. In the Gross Margin calculation, variable costs are grouped into the following categories: material costs (primary and auxiliary), variable machinery costs, external labor costs, mechanized service costs, and family labor costs.

Table 2. Material costs per unit of planting area (€/ha)

Indicator / Cost	Fertilizer	Plant protection	Diesel fuel	Others material costs	Total (no.€/ha; €/kg)
Number of farms *	162	164	169	48	174
Min (€/ha)**	17.07	102.44	23.78	47.81	191.10
Max (€/ha)	1343.12	1792.73	580.67	1422.80	5139.32
Average (€/ha)	489.90	510.21	176.95	52.79	1229.85
Average (€/kg)	0.05	0.05	0.02	0.01	0.12

Source: author's calculation

Note: *number of farms on which a certain cost was recorded; **for farms that recorded the certain cost

The expenses associated with mineral fertilizers and animal manure are accounted for within the overall fertilizer cost category. Additional production material costs encompass hygiene products, single-season binders, and water. However, expenditures for plastic clips used to secure shoots—given their multi-year utility are excluded from the calculation of variable costs.

Table 2 indicates substantial variability in material costs across the surveyed farms in 2024. The average weighted material cost, calculated per unit of planting area, amounted to 1229.85 €/ha for the sample of 174 farms. Within the structure of total variable costs per unit of final product, material inputs contributed an average of 0.12 €/kg. These relatively low material input costs are primarily attributable to high yield levels, which reflect the favorable agroecological conditions prevailing during the 2024 production season.

The success of raspberry production is predominantly contingent upon the availability and proficiency of skilled manual labor. Consequently, it is essential to conduct a thorough analysis of labor consumption and associated costs. Manual operations are typically executed through a combination of hired external labor and unpaid family labor, each contributing distinct economic implications to the overall production system.

Table 3. Costs of externally engaged labor force (w.day/ha)

Indicator / working operation	Soil cultivation	Fertilization	Pruning of young shoots	Pruning of old shoots	Harvest	Spraying
Number of farms*	109	85	146	110	174	74
Min Labor input ** (w.day/ha)	2.00	1.30	1.90	1.30	5.30	1.10
Max Labor input (w.day/ha)	35.00	26.70	80.00	50.00	366.70	20.00
Average Labor input (w.day/ha)	6.50	4.70	16.70	8.10	135.20	3.50
Normative labor input (w.day/ha)	20.00	9.00	20.00	10.00	50*** kg/day	6.00

Source: author's calculation

Note: *number of farms that hired external labor for a specific work operation; **for farms that hired external labor; ***productivity of manual picking

The analysis revealed that in 2024, not all surveyed farms employed external labor across all manual work operations, with the exception of raspberry harvesting. Specifically, external labor was engaged on 109 farms for soil cultivation, 85 for fertilization, 146 for the removal of young shoots,

110 for pruning and removal of old shoots, and 74 for the application of plant protection agents. Raspberry harvesting emerged as the sole manual operation consistently performed with the assistance of external labor on every selected farm. Moreover, harvesting represents the activity with the highest average engagement of external labor across the sample. From Table 3, it can be seen that in 2024, external labor costs were subject to large variations between farms. The average external labor input was 174.7 w.day/ha.

Spraying can be performed manually or mechanized. The expenses associated with hiring external mechanization for spraying are classified under external mechanization service costs. In contrast, the quantity and cost of external labor engaged in manual spraying are documented separately within the labor input records.

The daily wage rates paid to external laborers on the selected farms in 2024 exhibited considerable variation, both across different work operations and among individual farms.

Table 4. Unit Prices of Work Operations Performed by Externally Hired Labor (€/w.day)

Indicator / Operation	Soil Cultivation	Fertilization in the row	Removal of young shoots	Removal of old shoots	Harvest	Spraying
Lowest price (€/w.day)	25.60	25.60	25.60	25.60	25.60	25.60
Highest price (€/w.day)	42.66	42.66	51.19	51.19	59.73	42.66
Average (€/w.day)	40.10	40.93	40.39	40.67	42.07	41.36

Source: author's calculation

Survey (2024) results indicate that daily wage rates are primarily influenced by the geographical location of the farm. For the purpose of cost estimation, family labor expenses on each farm were calculated using the same daily wage rates applied to corresponding work operations performed by externally hired labor.

Additional family labor costs encompass operations such as shoot tying and wire tensioning, various forms of transportation, irrigation activities, as well as the loading and transport of both input materials and harvested products.

Table 5. Variable costs on selected farms in 2024

Indicator/ Cost	Production material	External labour	Mechnised services	Variable Costs 1	Family labour	Variable Costs 2
Min (€/ha)	170.74	160.06	42.68	634.92	1128.75	4234.25
Max (€/ha)	4219.45	18638.67	2580.01	21120.03	26739.37	31639.24
Average (€/ha)	1229.85	7327.43	181.27	8738.56	5911.10	14649.66
Average (€/kg)	0.12	0.70	0.02	0.83	0.56	1.40
Average (%)	8.40%	50.02%	1.24%	59.65%	40.35%	100.00 %

Source: author's calculation

Table 5 reveals substantial variability in the levels of variable costs across the surveyed farms in 2024. It is essential to delineate between the average recorded variable costs (Variable Costs 1) and the total variable costs (Variable Costs 2), which encompass the estimated average costs of family labor. The recorded variable costs were derived from survey data and reflect actual expenditures incurred during the 2024 production cycle. In contrast, family labor costs were estimated using normative labour input values and prevailing market rates for external labor.

In 2024, the average variable costs excluding family labor were calculated at 8738.56 €/ha. When combined with the estimated family labor costs of 5911.11 €/ha, the total average variable costs amounted to 14649.66 €/ha.

When expressed per unit of raspberry production, the total variable costs equated to 1.40 €/kg, of which 0.83 €/kg (59.65 %) represented recorded variable costs, and 0.56 €/kg (40.35 %) corresponded to estimated family labor costs.

Table 6. Gross margin of selected farms in 2024

Indicator / Value	Min (€/ha)	Max €/ha)	Average (€/ha)	Average (€/kg)
Value of production	5361.11	57905.07	22561.34	2.15
Variable Costs 1	634.92	21120.03	8738.56	0.83
Variable Costs 2	4234.25	31639.24	14649.66	1.40
Gross margin 1	1102.19	53005.21	13822.78	1.32
Gross margin 2	-2454.54	26265.84	7911.69	0.75

Source: author's calculation

Large differences in the value of production, as well as in variable costs, in 2024 also affected large differences in gross margins on selected farms. The average gross margin without family labor costs (Gross margin 1) was 13822.78 €/ha, or 1.32 €/kg. The average gross margin with calculated family labor costs (Gross margin 2) was 7911.69 €/ha, or 0.75 €/kg. Incorporating estimated family labor costs into the total variable costs (Variable Costs 2) resulted in a reduction of the average gross margin by 5911.10 €/ha, equivalent to a 42.8 % decline.

In 2024, the surveyed family farms recorded an average raspberry yield of 10501.45 kg/ha, substantially exceeding the national average of 4.0 t/ha reported for Serbia (SORS, 2025). This yield aligns with the production levels typically employed in economic analyses of raspberry cultivation, which range from 10 t/ha to 11 t/ha as reported in previous studies. (Veljković, et al, 2024; Kljajić, et al, 2017; Apáti, 2014). The achieved average production value per unit of product, amounting to 2.15 €/kg of raspberries, exceeds the national average annual purchase price of 2.01 €/kg for Serbia in 2024 (SORS, 2025). This discrepancy is due to differences in purchase prices, diverse sales channels, and the impact of government subsidies, including support for basic land cultivation, insurance premium incentives, and excise tax refunds on diesel fuel.

CONCLUSION

The economic assessment of raspberry production on selected farms in the Republic of Serbia for the 2024 season highlights pronounced variability in production results, cost composition, and profitability indicators. Although agroecological conditions were generally favorable, significant differences

emerged in terms of yield levels, input utilization, labor requirements, and achieved market prices. Notably, the average yield recorded on the selected farms substantially exceeded the national average for raspberry production.

An important finding of this study is the critical role of labor—particularly family labor—in shaping the economic viability of raspberry production. Family labor accounted for approximately 40.35 % of total variable costs, emphasizing its economic significance despite being traditionally excluded from formal accounting records. When family labor costs are incorporated, the average gross margin per hectare is reduced by 42.8 %, highlighting the importance of comprehensive cost accounting for accurate profitability assessment.

The distinction between recorded variable costs (Variable Costs 1) and total variable costs including imputed family labor (Variable Costs 2) is essential for methodological transparency and policy relevance. Omitting family labor cost underestimating production expenses and overstating farm profitability, particularly in labor-intensive crops such as raspberries.

Given the variability in farm performance and cost structures, future advisory and policy efforts should prioritize labor efficiency, cost optimization, and market access strategies. Moreover, standardized methodologies for estimating family labor costs—whether through normative input coefficients, expert assessments, or farm-level surveys—should be integrated into routine economic evaluations to ensure comparability and reliability.

This research contributes to the broader understanding of horticultural economics in Serbia and provides a foundation for evidence-based decision-making aimed at improving the sustainability and competitiveness of raspberry production systems.

ACKNOWLEDGMENTS

The research was conducted under the Contract on the implementation and financing of scientific research in 2025 between the Institute for Science Application in Agriculture and the Ministry of Science, Technological Development and Innovation of the Republic of Serbia, No. 451-03-136/2025-03/ 200045.

DECLARATION OF CEMPETING INTERESTS

Authors must disclose any personal and/or financial relationships with other people or organizations that could inappropriately influence (bias, non-compliance with the academic code) their work.

REZIME
EKONOMSKA ANALIZA PROIZVODNJE MALINE NA NIVOU VARIJABILNIH TROŠKOVA U SRBIJI U 2024 GODINI

Proizvodnja maline u Republici Srbiji ima značajnu ulogu u poljoprivrednoj ekonomiji, posebno za mala gazdinstva u brdsko-planinskim regionima. Sorta Vilamet, kao najzastupljenija, ima dominantan ekonomski značaj. Ova studija predstavlja ekonomsku analizu proizvodnje maline zasnovanu na podacima prikupljenim sa 174 odabrana gazdinstva tokom proizvodne 2024. godine. Utrošak porodične radne snage je procenjen na osnovu utrošaka radne snage za različite radne operacije pomoću konsultacija sa stručnjacima poljoprivrednih stručnih savetodavnih službi Srbije i literature.

Analiza je fokusirana na strukturu varijabilnih troškova, uz jasno razgraničenje između evidentiranih izdataka i ukupnih varijabilnih troškova koji uključuju procenjene troškove porodičnog rada. Rezultati ukazuju na značajnu varijabilnost u prinosima, korišćenju inputa, intenzitetu rada i ostvarenim tržišnim cenama, uprkos povoljnim agroekološkim uslovima u posmatranoj godini. Značajno je napomenuti da je prosečan prinos na odabranim gazdinstvima znatno viši od republičkog proseka.

Troškovi rada, naročito porodičnog rada, pokazali su se kao najuticajnija komponenta ukupnih varijabilnih troškova, sa udelom od 40.35 % u proseku. Kada se porodični rad uključi u obračun, prosečna bruto marža po hektaru opada za 42.8 %, što naglašava važnost sveobuhvatnosti obračuna troškova. Studija ističe potrebu za uključivanjem vrednovanja porodičnog rada u ekonomske analize kako bi se izbegle pogrešne interpretacije profitabilnosti.

Ovi nalazi pružaju osnovu za unapređenje savetodavne prakse, preciznije metodologije obračuna troškova i oblikovanje mera politike usmerenih ka održivosti i konkurentnosti proizvodnje maline u Srbiji.

Ključne reči: Willamette sorta maline, varijabilni troškovi, bruto marža

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Ovaj rad je primljen **22.10.2025,** a na sastanku redakcije časopisa prihvaćen za štampu **19.11.2025.** godine.

UDK: 338.43:658]:004.9

Scientific Review Article

POSLOVNA EKONOMIJA
BUSINESS ECONOMICS
Godina XIX
Broj 2
Str: 66 – 80
DOI: 10.5937/poseko28-63564

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THE IMPORTANCE OF AGRICULTURAL MANAGEMENT FOR THE DEVELOPMENT OF MODERN DIGITAL TRANSFORMATION OF AGRICULTURE

ABSTRACT: The role of agricultural management nowadays can be economic and organizational, technological and innovative, ecological and sustainable, developmental and social and are always accompanied by challenges such as risk management and making timely decisions. In addition, the availability and development of modern modern technologies contribute to timely and accurate monitoring of agricultural production. Today, the role of agricultural management is closely related to digital transformation, which implies the integration of digital technologies in all processes of production, management and distribution. In agricultural production, it manifests itself through smart irrigation systems, the use of drones for crop monitoring, sensors for soil moisture, as well as the use of artificial intelligence for yield analysis. The aim of this paper is

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to point out the importance of agricultural management in the process of digital transformation of agriculture, with special reference to modern technologies that shape agricultural production. The concepts of smart agriculture, the application of information systems and automation in order to increase the efficiency and sustainability of the agricultural sector were analyzed. In addition to the theoretical framework, the paper includes an example from practice - the application of digital solutions in Dutch agriculture. The paper concludes that digital transformation is a key component of modern agricultural management, which enables competitiveness, rational use of resources and sustainable development.

Keywords: agriculture, management, sustainable development, digital transformation, agriculture.

INTRODUCTION

Management as a scientific discipline aims to organize, plan, lead, and control processes in order to achieve predefined goals (Vojinović, 2014). Within the agricultural sector, management takes on specific characteristics conditioned by the nature of production, seasonal work, and dependence on climatic factors. Agrarian management is a part of management that involves managing the entire system, which connects suppliers of raw materials, agricultural holdings, processing steps, logistics, and the market into a single value chain.

Agricultural management is a set of principles, methods, and tools that enable the efficient management of agricultural resources (Đurić, 2021). In this system, decisions are not viewed in isolation, but in relation to customer requirements, quality standards, and financial sustainability (Grujić & Ignjatović, 2024). The essence is to bring biological processes, which are variable by nature, under management discipline and transform them into reliable deliveries with measurable performance. Thus, agricultural management builds a bridge between the field and the market, preserving the stability of income and product quality (Davis & Goldberg, 1957). It includes production planning, organizing work, making investment decisions, controlling costs, and achieving optimal productivity. Accordingly, the basic functions of management (planning, organizing, leading, and controlling) are adapted to the specifics of the agricultural sector. A modern agricultural manager must be familiar with market trends, agricultural technologies, and the principles of sustainability (Cvijanović et al., 2012).

In addition, an integrated approach means that production, quality, finance, marketing, and logistics work as a coordinated mechanism. When activities are synchronized along the value chain, waste, quality declines, and delays are reduced, while customer confidence and contribution margins are increased. In practice, this means clear plans per crop/line, consistent procedures, and continuous monitoring of indicators that signal deviations early. This logic becomes a source of competitive advantage even on small farms, as it allows for better cost control and more predictable cash flow (Robbins & Coulter, 2018).

The development of digital technologies in the 21st century has led to the transformation of all sectors of the economy, including agriculture, resulting in the emergence of the concept of smart agriculture (Petrović et al., 2022). Technological innovations refer to the application of new technologies in production (precision agriculture, automation, and digitalization—such as drones for monitoring fields, sensors for monitoring growth conditions, and software for optimizing production), which can increase efficiency and reduce costs (Blagojević et al., 2024).

Lack of innovation and insufficient application of modern technologies (precision agriculture and digital production management tools) are also a significant challenge, as the use of outdated equipment and technology reduces production efficiency, limits opportunities for improving product quality, and decreases productivity and competitiveness (Bajagić & Ignjatović, 2025).

The aim of this paper is to point out the importance of agricultural management in the process of digital transformation of agriculture, with special reference to modern technologies that shape agricultural production. In addition to the introduction, the work consists of three parts that indicate the role of agricultural management, contemporary digital transformation in agriculture, and the impact of digitization on agricultural management. Finally, concluding remarks are given.

THE ROLE OF AGRARIAN MANAGEMENT

Agrarian management represents the systematic administration of agricultural resources—land, labor, capital, and technology—with the goal of ensuring sustainable and profitable food production. In modern conditions of globalization and climate change, its role goes beyond the traditional understanding of farm management and becomes a strategic function that connects the economic, ecological, and technological aspects of rural development (FAO, 2014).

Economic and Organizational Role – One of the main functions of agrarian management is to increase the economic efficiency and competitiveness of agricultural production. Through planning, cost analysis, and data-driven decision-making, managers rationalize resource use, reduce losses, and improve productivity (Rose, 2019).

Modern approaches, such as the concept of Integrated Farm Management, combine economic and ecological goals, enabling simultaneous yield growth and soil fertility preservation (Power, 2010). Efficient management also ensures proper organization of work and coordination between production, procurement, sales, and finance sectors, achieving stable and functional operations (Hauser, 2016).

Technological and Innovative Role – Modern agrarian management plays a key role in introducing precision agriculture and digital technologies. The use of drones, sensors, GPS systems, and data analytics enables precise irrigation, fertilization, and crop protection, leading to higher yields with lower resource consumption (Monteiro, 2021). Artificial intelligence and big data systems are used to forecast weather conditions, manage livestock nutrition, and monitor market trends (Padhiary, 2024). Although these technologies require significant investment and technical training, research confirms that they contribute to sustainable modernization and risk reduction in production (U.S. Government Accountability Office, 2024).

Risk Management and Decision-Making – Agriculture is exposed to numerous uncertainties—climate change, price fluctuations, crop diseases, and regulatory constraints. The manager's role is to anticipate, assess, and mitigate these risks using flexible strategies and scenario planning (Barnes, 2013). Production diversification, crop insurance, and adaptive planning are key tools for maintaining financial stability and long-term sustainability (Hanger-Kopp, 2022). Risk perception and information availability significantly influence farmers' readiness to adopt innovations and sustainable practices, while the resilience of agricultural systems depends on managers' ability to adapt to market and environmental changes, ensuring long-term sustainability (Darnhofer, 2014).

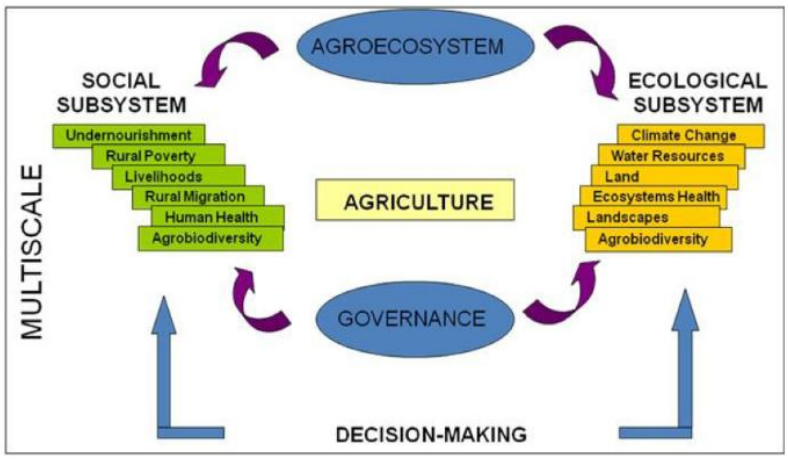
Ecological and Sustainable Role – Agrarian management plays a crucial role in preserving ecosystem services—soil fertility, water quality, carbon regulation, and biodiversity protection (Paudel, 2021). By applying sustainable practices such as reduced tillage, cover crops, and agroforestry, managers align production goals with natural resource conservation (Bahmutsky, 2024). This approach aligns with the FAO definition, according to which sustainable agriculture means conserving resources while meeting the needs of current and future generations (Khattak, 2025).

Developmental and Social Role – Transformations in the agrarian sector depend on institutional reforms that enable local communities to

participate in decision-making. In this context, agrarian management connects market structures, state policies, and producers, promoting sustainable practices and reducing inequalities in resource access (Borras, 2023).

The sustainability of rural areas depends on innovations that arise from local communities and their knowledge of resources. Agrarian managers play a key role in creating conditions for such innovations through education and participatory decision-making within the community (Chambers & Conway, 1992). Further, Figure 1 presents agriculture as a complex socio-ecological system.

Figure 01. Agriculture as a complex socio-ecological system.



Source: Rivera-Fere et al. 2013.

THE CURRENT DIGITAL TRANSFORTMATION IN AGRICULTURE

The process of digital transformation involves the integration of digital technologies into all stages of agricultural production, management, and distribution, with the aim of making decisions based on real-time data (Kahrović, 2021). In practice, this includes smart irrigation systems, drones for remote crop monitoring, soil moisture and temperature sensors, and machine learning algorithms for yield forecasting and input optimization (Monteiroet al., 2021). Artificial intelligence is used to analyze large data sets and generate recommendations that reduce costs and risks (Padhiary et al., 2024).

At the global level, these approaches are known as "smart agriculture" and "precision farming," and are broadly supported by the European Commission's agricultural digitization policies (European Commission,

2025). In practice, platforms that integrate satellite imagery, agro-meteorological data, and field measurements are increasingly being used; one example is AgroSens, which enables plot monitoring, field diary keeping, and fertilizer dosing based on vegetation indices (Agrosens, 2025). At the operational management level, sensor networks and multispectral cameras monitor crop conditions and conditions in livestock production facilities, while robotic mechanization automates sowing, harvesting, and treatments (Petrović, et al., 2022).

These data streams provide analytical insights for input planning and timely intervention, increasing the efficiency of resource use (U.S. Government Accountability Office, 2024). In addition, advanced computational methods help in the selection of varieties that are more tolerant to stress and disease, thereby optimizing decisions along the supply chain from field to market (FAO, 2014). Picture 1 shows a symbolic model of precision agriculture that combines remote sensing, sensor networks, and analytical platforms into a single decision-making system—from irrigation to crop protection.

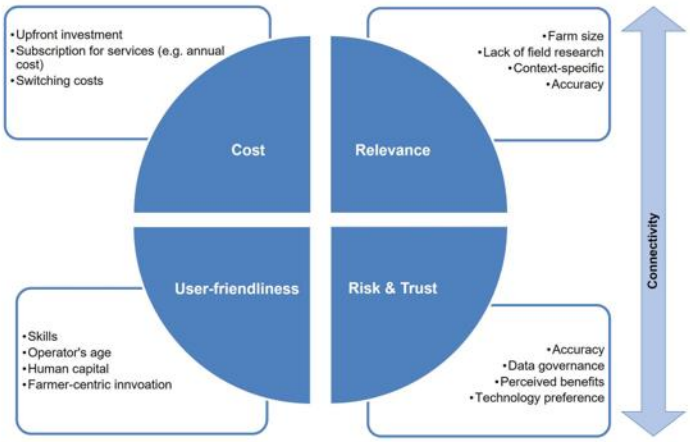
Picture 01: Imaginary representation of a precise field guide

Source: https://blog.rfmann.com.br/impactos-agricultura-precisao-demanda-pecas-agricolas/

Existing literature on rural modernization identifies a variety of factors that influence agricultural development, including economic, institutional, and technological factors. Most existing research has concentrated on the benefits of digital technologies in urban and developed areas, where improvements in infrastructure and innovation have markedly enhanced environmental efficiency and resource utilization. However, the understanding of how these technologies shape rural agricultural practices, especially within the context of green innovation and sustainable development, is still limit. Prior studies

have largely examined the digital economy's impact on isolated aspects of rural development, such as inclusive finance and agribusiness (Frontiers, 2024).

Figure 02: Identified constraints to digital adoption on-farm



Source: OECD, 2024.

Problematically, existing evaluation frameworks often rely on narrow economic indicators, or they lack the capacity to capture the multidimensional nature of rural agricultural modernization. To address this gap, this study proposes the RAMDI, a composite measure that integrates sustainability, infrastructure, productivity, and institutional resilience into a unified framework (The digitization of agricultural industry, 2023.)

THE IMPACT OF DIGITALISATION ON AGRICULTURAL MANAGEMENT

Managing farms using automation and artificial intelligence brings savings through reduced need for physical labor in the field, timely intervention in the event of disease or damage, and variable and optimal application of fertilizers and treatments according to soil heterogeneity and crop condition (Padhiaryet al., 2024). At the same time, the transition to data-driven decision-making enables managers to plan production more accurately and reduce input waste at all stages of the cycle (U.S. Government Accountability Office, 2024). This approach is in line with the EU's agricultural digitization policy, which sees digital tools as a means to greater efficiency, sustainability, and competitiveness across the entire sector (European Commission, 2025).

Drones (Picture 03) are used to monitor and map problem areas, as well as for targeted spraying, reducing manual labor and resource consumption while increasing treatment coverage (Monteiro et al., 2021). GPS guidance and RTK corrections ensure precise pass switching and reduce losses due to double processing, while sensor networks (soil moisture, temperature, microclimate) provide data for optimal irrigation and more efficient resource management (Petrović et al., 2022). In practice, integrated platforms such as AgroSens facilitate decision-making at the plot level by combining satellite imagery, meteorological measurements, and field logs (Agrosens, 2025).

Despite the benefits, barriers remain: inadequate broadband infrastructure in rural areas, high initial investments, and a lack of digital skills hinder the adoption of technology (Bajagić & Ignjatović, 2025). The OECD emphasizes that data standardization, interoperability, and clear data management models are prerequisites for the full effect of digitization, while the FAO points out that the new generation of digital automation is changing the organization of work and the profiles of skills required in agriculture (OECD, 2022; FAO, 2022). When institutions, advisory services, and innovation hubs work in concert, the diffusion of innovation is rapid, and small producers can more easily enter digital ecosystems (World Bank, 2025).

In Serbia, there is a visible increase in interest in digital solutions, combined with own investments and support through support programs; the managerial task is to integrate these tools into the planning, monitoring, and evaluation processes in order to achieve more stable returns, lower costs, and greater competitiveness (Cvijanović et al., 2021; Đurić, 2021).

Picture 03: Use of drones in agriculture

Source: https://skylinedrones.ro/is-the-agras-t50-drone-more-productive-than-the-t30/

The increased use of digital applications in agriculture leads to larger amounts of data that are very specific and diverse. The collection of agricultural data includes land, crops, livestock, agricultural data, climate data, machinery data, financial data, and compliance data. Farmers may consider some data to be personal or sensitive, such as data on tractor routes that lead to successful production. Agricultural companies may consider other data to be confidential. Agricultural data, especially when available to many farms, is important not only to farmers but also to the entire value chain, e.g., for market forecasting, product development, and insurance. Farmers are concerned that third parties could use their data without their consent or knowledge. The protection of trade secrets is of key importance. It is therefore essential to ensure protective measures for data exchange, data accuracy, and data security in order to build trust and not jeopardize the further development and acceptance of smart agriculture. Table 01 shows that there are significant differences in the degree of digitization between countries, confirming that Serbia, with a significantly lower percentage of digital farms, still has great potential for technological progress in relation to developed agricultural economies such as the Netherlands and the United States.

Table 01: Distribution of digital farming by country

Country	Percentage of digitized farms	Most commonly used technologies
Serbia	18	Irrigation systems, GPS mechanization
Netherlands	76	Drones, automated bottling, AI analytics
USA	65	Big data, IoT sensors, satellite tracking
Germany	59	Robotics, sensors, precision farming

Source: Đurić, 2021.

Globally, the use of drones and smart technologies in agriculture is growing rapidly and yielding significant savings in resources. In Serbia, the digital transformation of agriculture is in its early stages of development, with a gradual increase in interest and support from state initiatives such as eAgrar.

The Netherlands is considered a world leader in digital agriculture. Thanks to a combination of advanced technology and efficient management, this country achieves exceptionally high yields on a small area of land. Dutch farmers use automated greenhouses with sensors that control temperature, humidity, and light, thereby optimizing plant growth conditions. The integration of artificial intelligence enables precise analysis of crop needs and reduction of production costs. Accordingly, Table 2 shows current research

and data on the application of modern technologies, especially drones, in agriculture around the world and in Serbia. Key findings, values, and relevant sources are presented.

Table 02: Current research and data on the application of modern technologies

Indicator/finding	Value/finding	Additional information	Source
Number of agricultural drones in use globally (2023–2024)	> 300,000 drones	Used in more than 100 countries; used for spraying, mapping, and crop monitoring.	DJI Agricultural Drone Industry Insight Report 2023–2024
Farm area treated by drones globally by mid-2024	> 500 million hectares	Used to save water, reduce pesticide use, and monitor crop conditions.	DJI 2024 Report
Save water and pesticides through the use of drones	≈ 210 million tons of water and ≈ 47,000 tons of pesticides saved globally	Through spray treatment and precise chemical dosing.	DJI 2024 Report
Growth of the agricultural drone market (projection)	From USD 1.35–2.1 billion (2024) to USD 8+ billion by 2029–2034	Compound annual growth rate (CAGR) of 25–34%.	Global Growth Insights, 2024
Use of digital technology/smart farming in Serbia (Vojvodina)	Research on 46 farms – low adoption	Main barriers: finance, training, infrastructure.	Faculty of Economics, Subotica, 2023
Farms in Serbia using smart farming technologies	≈ 14 % (as part of the SmartAkis project research)	The sample is small, but indicates a lower level of digitization compared to the EU.	Wageningen University, SmartAkis project, 2023
Use of the eAgrar digital platform in Serbia	Survey of 510 farmers	The digital self – a need for further education.	Journal of Central European Agriculture, 2023

Source: European Commission, 2025.

CONCLUSION

The role of agricultural management is multifaceted and includes economic, technological and ecological aspects of development. Its task is to connect science, technology and practice and to translate innovations into

concrete decisions at the farm level. An effective agricultural manager today must combine profitability with sustainability, rationally use resources and contribute to the long-term development of agriculture as a key branch of the national economy. It is essential to state that global challenges initiate the availability and development of modern technologies that are necessary for precise agricultural production and relate to all processes of production, management and distribution. Modern technologies relate to smart irrigation systems, the use of drones to monitor crops, soil moisture sensors, and the use of artificial intelligence to analyze yields. The paper concludes that digital transformation is a key component of modern agricultural management, which enables competitiveness, rational use of resources and sustainable development. Modern agriculture represents one of the most important directions of development of today's society. It connects traditional ways of cultivating the land with modern technological achievements in order to obtain more efficient, economical and environmentally friendly food production. These technologies contribute to higher yields, reduce costs and enable better use of natural resources such as water and land. At the same time, modern agriculture plays an important role in preserving the environment, because more and more attention is paid to sustainable development. This is not only a way to produce more food, but also a way to a better and healthier life. It shows that technology can be an ally of man in taming nature and ensuring a secure future. With constant development and responsible use of new solutions, agriculture will continue to be one of the most important pillars of society's progress.

REZIME
ZNAČAJ AGRARNOG MENADŽMENTA ZA RAZVOJ SAVREMENE DIGITALNE TRANSFORMACIJE POLJOPRIVREDE

Uloga agrarnog menadžmenta u današnje vreme može biti ekonomska i organizaciona, tehnološka i inovaciona, ekološka i održiva, razvojna i društvena i uvek praćena izazovima kao što su upravljanje rizikom i donošenje pravovremenih odluka. Pored toga, dostupnost i razvoj savremenih modernih tehnologija doprinose pravovremenom i preciznom nadgledanju poljoprivredne proizvodnje. U današnje vreme je, uloga agrarnog menadžmenta usko vezana za digitalnu transformaciju koja podrazumeva integraciju digitalnih tehnologija u sve procese proizvodnje, upravljanja i distribucije, dok se u poljoprivrednoj proizvodnji manifestuje kroz pametne sisteme za navodnjavanje, korišćenje dronova za praćenje useva, senzore za vlažnost zemljišta, kao i upotrebu veštačke inteligencije za analizu prinosa. Cilj ovog rada je da ukaže na značaj agrarnog menadžmenta u procesu

digitalne transformacije poljoprivrede, sa posebnim osvrtom na savremene tehnologije koje oblikuju poljoprivrednu proizvodnju. Analizirani su koncepti pametne poljoprivrede, primena informacionih sistema i automatizacija u cilju povećanja efikasnosti i održivosti agrarnog sektora. Pored teorijskog okvira, rad obuhvata primer iz prakse – primenu digitalnih rešenja u holandskoj poljoprivredi. Rad zaključuje da digitalna transformacija predstavlja ključnu komponentu savremenog agrarnog menadžmenta, koja omogućava konkurentnost, racionalno korišćenje resursa i održivi razvoj.

Ključne reči: agrar, menadžment, održivi razvoj, digitalna transformacija, poljoprivreda.

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Ovaj rad je primljen **04.12.2025,** a na sastanku redakcije časopisa prihvaćen za štampu **23.12.2025.** godine.

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Год.1, бр. 1 (2007)-. - Сремска Каменица
(Војводе Путника 87) : Универзитет Едуконс, Факултет
Пословне економије,
2007-.-24 цм. –
Полугодишње

ISSN 1820/6859 = Пословна економија
COBISS.SR-ID 146187532