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TABLE OF CONTENTS OF THE JOURNAL

Issue 01/2026

<i>ČLANCI / ARTICLES</i>	11
CRIMINAL RECORD REPORT AND HUMAN RESOURCES	13
Dragana Lazić, Jelena Vuković, Dragan Manojlović	13
IZVEŠTAJ IZ KAZNENE EVIDENCIJE I LJUDSKI RESURS	29
MACROECONOMIC AND BANK-SPECIFIC DETERMINANTS OF NET INTEREST MARGINS: EVIDENCE FROM SERBIA	31
Mirjana Jemović, Srđan Marinković, Kristijan Ristić, Andreja Todorović .	31
MAKROEKONOMSKE I BANKARSKO-SPECIFIČNE DETERMINANTE NETO KAMATNIH MARŽI: EMPIRIJSKI DOKAZI IZ SRBIJE.....	47
THE IMPACT OF TAX BURDEN LEVELS ON LONG-TERM ECONOMIC ACTIVITY.....	49
Dragan Avramović, Dalibor Šare	49
UTICAJ NIVOVA PORESKOG OPTEREĆENJA NA DUGOROČNU EKONOMSKU AKTIVNOST	67
EVOLUTION OF FINANCIAL REPORTING LEGAL REGULATIONS IN THE EUROPEAN UNION AND IMPLICATIONS FOR SERBIA	69
Zorana Tijanić, Aleksandra Zlatić Tešić, Snežana Krstić i Radovan Damnjanović	69
EVOLUCIJA PRAVNE REGULATIVE FINANSIJSKOG IZVEŠTAVANJA U EVROPSKOJ UNIJI I IMPLIKACIJE ZA SRBIJU.....	95
INCOME DISPERSION DYNAMICS IN THE EUROPEAN UNION AFTER THE GLOBAL FINANCIAL CRISIS	97
Dejan T. Šušakvević, Milica Popović, Svetlana Marković	97
DINAMIKA DISPERSIJE DOHOTKA U EVROPSKOJ UNIJI NAKON GLOBALNE FINANSIJSKE KRIZE	114

COMMUNITY SUPPORT FOR FAIRS AND TOURISM EVENTS AS A FACTOR IN DESTINATION POSITIONING	115
Nedeljko Prdić, Tamara Gajić, Jasmina Gligorijević.....	115
PODRŠKA LOKALNE ZAJEDNICE SAJMOVIMA I TURISTIČKIM DOGAĐAJIMA KAO FAKTOR POZICIONIRANJA DESTINACIJE ...	143
THE INFLUENCE OF SELECTED SOCIO-DEMOGRAPHIC VARIABLES ON THE DIFFERENCES IN THE QUALITY OF EXPECTED AND PERCEIVED ATTRIBUTES OF SPA SERVICES IN CENTRAL AND SOUTHEASTERN EUROPE	145
Jelena Premović, Marko Pavlović, Aleksandar Brčić.....	145
UTICAJ ODABRANIH SOCIODEMOGRAFSKIH VARIJABLI NA RAZLIKE U KVALITETU OČEKIVANIH I PERCEPCIRANIH ATRIBUTA SPA USLUGA U CENTRALNOJ I JUGOISTOČNOJ EVROPI	168
ARTIFICIAL INTELLIGENCE AND OTT PLATFORMS -ADVANTAGES AND RISKS.....	169
Tatjana Ćitić	169
VEŠTAČKA INTELIGENCIJA I OTT PLATFORME – PREDNOSTI I RIZICI.....	185
<i>INSTRUCTIONS FOR AUTHORS</i>	187
<i>INSTRUCTIONS FOR REVIEWERS</i>	195

ČLANCI / ARTICLES

CRIMINAL RECORD REPORT AND HUMAN RESOURCES

Dragana Lazić¹, Jelena Vuković², Dragan Manojlović³

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Review Article

Abstract

Employment is among the most consequential steps an individual undertakes to secure multidimensional life stability, and one of the obstacles to achieving this objective is a criminal history dossier—i.e., a criminal record. The criminal record report occupies an important place in human resource development and in delineating the scope of professional employment. Tracing the dividing line between these two constructs in the scholarly literature and professional practice, the present study examines the correlation between criminal record reports and human resources. The aim of the study is, through the application of scientific methods—content analysis of existing research findings (scientific contributions and professional practice), historical analysis, quantitative and qualitative analysis, comparison, correlation, description, and synthesis—to present the scope of the effects of the document—the criminal record report—on a human resource with a criminal history (criminal record) when submitting an application to a job competition for the purpose of employment. As the findings indicate, submitting a criminal record report as part of a job application produces a collateral consequence: in the majority of cases, the individual is prevented, at the very outset—upon filing the application—from continuing further through the stages of the recruitment procedure. The results further show that, while efforts are being made to provide convicted persons with a second chance, the number of requests for criminal record reports in the context of employment is simultaneously increasing.

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Introduction

In general linguistic terms, the concepts of human resources and the criminal record report are polysemous and may be identified across numerous scientific disciplines (Roberts, 2022); as demonstrated in this paper, they are examined within the fields of legal scholarship and human resource science. This study addresses, within the context of the possibility of establishing an employment relationship, the extent to which research findings indicate that an institution such as the existence of a criminal history places human resources in a position where individuals are not treated equally after submitting an application to a job competition (Westrope, 2018). It requires little effort to find in the literature that many organizations assert that human resources constitute their most valuable asset, while, at the same time, those very human resources may also be a generator of problems within a company (Mayo, 2016). Reducing potential problems that human resources may cause in a company is, in part, pursued through the choice—i.e., the selection—of human resources in the course of a job competition (Schuler, Jackson, 1987). It is precisely at this point, that—among other documents—the criminal record report appears within the documentation submitted with an application to a job competition, and it is considered capable of contributing to a higher-quality selection of future employees, while reducing the likelihood that a human resource will become a generator of problems within the company (Budhwar et al., 2023).

The criminal record report plays a significant role in an employer's decision as to whether—and for which individual—to enable the establishment of an employment relationship (Lam, Harcourt, 2003). Available research suggests that the majority of employers ask candidates, already at the stage of submitting an application to a job competition, about their criminal record—i.e., a criminal background check (Denver et al., 2018). Researchers have further observed that, prior to the enactment of legal instruments prohibiting employers from inquiring into an applicant's criminal history at the application stage—for example, in the United States, on an annual basis, more than 31 (thirty-one) million adults who applied for employment were asked about their criminal (criminal-record) history immediately upon submitting the application (Selbin et al., 2018).

The literature indicates that employment has a significance that goes beyond the obvious benefits for the individual (Scire, Raimondi, 1999). It has been shown

that work—or the loss of employment—affects mortality (Sullivan, Von Wachter, 2009), happiness (Blanchflower, Oswald, 2004), criminal activity (MacKenzie, 2006), and even subsequent earnings and social assistance received by workers’ children (Oreopoulos et al., 2008). In addition, it may be concluded—consistent with the focus of this paper—that individuals with a criminal record are penalized in the labour market (Petersen, 2016). It is believed that persons with a criminal record may systematically differ from their peers with the same level of education; that is, for some employers, having a record is associated—not in every case, but on average—with various negative characteristics that reduce individuals’ readiness for work (Solga, 2002). All of the foregoing indicates that employers have a strong incentive to hire only those candidates whom they believe will constitute a highly productive match with the firm, given that employing workers who later prove unsuitable for the job is costly (Bishop, Abraham, 1993).

Researchers’ entry into the study of the relationship between the criminal record report and human resources—often referred to as collateral consequences—has made it possible to reveal the depth of stigma-cycle formation, as individuals with a criminal record, when submitting an application to a job competition, encounter a “wall”: the first stage which, in a large number of cases, is impossible to pass (St Helene-Uko, 2017).

As may be discerned from the introductory remarks, among several domains pertaining to human resources—such as: staffing (e.g., decisions relevant to recruitment and selection); employee rewards (e.g., decisions on salaries and promotions); employee development (e.g., decisions aimed at enhancing the skill and competency levels of individuals and teams); and employee relations, encompassing perceptions, processes, and institutions within the employee–employer relationship—the present study, within the limits of the paper’s permitted technical scope, addresses only the first domain and only one of its components, namely the criminal record report of the human resource, as a document that employers frequently require to be submitted as part of the documentation accompanying an application to a job competition.

Analysis and discussion of the results of theoretical and empirical research

A substantial body of research indicates that, once an individual is assigned a criminal file, they incur harms that, for them, almost never cease (Pager, 2003). Criminal records follow persons convicted of crimes throughout their lives, creating collateral consequences that make it difficult for them to return to the

community after serving a custodial sentence and to reintegrate into society (Pinard, Thompson, 2005).

Employment is one of the most important steps an individual undertakes in order to secure life stability; however, one of the most substantial (often insurmountable) obstacles to achieving this objective is precisely the criminal record file (Gallie, 2002; Kapur, 2024). Why is this the case? Because employers are often cautious when hiring individuals with criminal records due to concerns about liability and the social stigma that is frequently attached to persons with such records (Uggen et al., 2014). Although legal instruments prescribe procedures and obligations regarding the so-called expungement of the status of a convicted person (i.e., a person with a criminal record), this does not mean that discrimination in employment thereby ceases (Cundiff, 2016). For example, in the United States alone, more than seven hundred thousand individuals are released from prison each year, which suggests that approximately one in three people has a criminal history and a criminal record (Durose et al., 2015). Research findings further indicate that, when submitting documentation for a job competition, more than 60% of employers refuse to hire a human resource with a criminal history where the criminal record report shows that the person has a criminal record (Ouwerkerk et al., 2015). Employers continue to rely on information contained in criminal records when screening job candidates and, in the vast majority of cases, hire workers who do not have a criminal record (Kajeepeta, 2025).

Researchers such as Blumstein and Nakamura, in their article “*Redemption in the presence of widespread criminal background checks*”, find that 93% of surveyed employers conduct criminal background checks for at least some positions, and that more than one half of them, at the very first step, are not prepared to employ a person who has a criminal record. These findings are based on a random sample of approximately 3,000 human-resources professionals. Within the sample, 65% worked in organizations with 500 or more employees, 28% in organizations with 100–499 employees, and 7% in organizations with 1–99 employees (Blumstein, Nakamura, 2009). In assessing the risk of employing persons with a criminal history, the research findings indicate: “*first*, that employers’ use of criminal records in employment decision-making may unfairly disadvantage persons who have served custodial sentences (Petersen, 2016); *second*, that the results of employer surveys provide insight into how employers make hiring decisions regarding former offenders, which substantially assists policymakers in this field; *third*, that the results of this study are consistent with a survey conducted by the Society for Human Resource Management concerning employers’ concerns about hiring former offenders

(Young, Powell, 2015); and, finally, *fourth*, that, drawing on broader behavioural science and legal scholarship, the research provided high-quality material for developing guidelines—both for employers and for courts—regarding the fair and effective use of criminal records in human-resource hiring decisions” (Rowley, Jackson, 2010).

Although to date relatively little research has focused on the consequences of criminal sanctions for the employment of a human resource and its development, a growing body of evidence suggests that contact with the criminal justice system may lead to a substantial reduction in a human resource’s opportunities for employment (Smith, Simon, 2020). Using longitudinal research data, researchers examined the employment probabilities of human resources after release from institutions for the execution of criminal sanctions, and in doing so *found* a strong and consistent negative effect of a criminal history (criminal file)—i.e., the criminal record report—on the possibility/impossibility of establishing an employment relationship (Pager, 2003; Westrope, 2018). In line with these results, the so-called direct-causality model has been developed: the criminal history (past) recorded in the criminal file, the criminal record report issued on that basis, and its impact on the employment outcome, with a direct causal link between the two (Gubernick, 2017).

Empirical evidence regarding the adverse impact arising from the use of information from criminal records shows that, in a large proportion of cases (more than 60%), the criminal record report affects the employer’s decision whether to employ a human resource (Agan, Starr, 2017). Further, for example, research findings indicate that 12.8% of all adult men in the United States have, or have had, a criminal record (Tillman, 1987). A pivotal research finding is that more than 12 million former offenders in the United States are available for work (i.e., are of working age), which represents approximately 8% of the working-age population (Kethineni, Falcone, 2007). The overall effect of the stated incarceration rate (number) in institutions for the execution of criminal sanctions is exceptionally high, given its broad impact on the employment of former offenders (Whittle, 2018). A study using 2000 U.S. Census data found that, among men born between 1965 and 1969, 3.2% had served a prison sentence (Western, 2007).

In recent years, substantial policy attention in many countries has been directed toward expanding employment opportunities for human resources with a criminal record (Newell, 2013). These efforts are motivated by the assumption—supported by observational, survey, and experimental research—that applicants with a record are, when applying to a job competition, placed in

a less favourable position by employers than applicants without a criminal record (Pager, 2003). Proponents of policy change with respect to the employment of persons with criminal records—the so-called “second chance” agenda—believe: *first*, that there is sufficient credible research evidence showing that elimination at the very outset—i.e., in the initial stage immediately after submission of a job-competition application—prevents many candidates with criminal records from having an opportunity to present themselves to the employer; *second*, that a comparison of the period prior to the adoption of legal instruments prohibiting, in certain sectors, the exclusion of job applicants in the initial stage of the hiring process shows that employers were 60% more likely to invite candidates without a criminal record, whereas in the period following the adoption of such legal instruments the disparity was reduced to approximately one third, or about 20% (Mukamal, 1999); moreover, of the latter group, more than 60% of applicants with a record—after being given an opportunity to present themselves in the initial stage—advanced to a subsequent stage of the recruitment process.

In parts of Europe—such as the Scandinavian countries—it is considered that the collection of data and the maintenance of criminal records represent an old, classical form of surveillance, viewed as a necessary component for the development of the modern state and the welfare system (Weller, 2012). Authors note, for example, that “Sweden, when viewed from the outside, has been described as a model surveillance society in the Western world” (Flaherti, 1989). As Lyon observes, “surveillance and record-keeping are, however, not only of value to the state; they also constitute a vital precondition for the creation of trust in contemporary society between the state and citizens, among citizens themselves, and between citizens and private companies” (Lyon, 2001). Data from criminal records are regarded, in Scandinavian countries, as sensitive information (Jorgensen, 2014). In light of this, in the 1960s, courts considered that mere awareness of a record—and the possibility that it might be used in the future—constituted a burden for former offenders and an impediment to their resocialization (Backman, 2011). As a consequence, the existence of a prior criminal conviction—typically characterized by low “visibility” (Goffman, 1990, 65)—made it possible to keep such information hidden from others. Employers, for instance, have consistently maintained the view that criminal-history data may assist them in recruiting employees who are law-abiding and worthy of their trust (Levy McCanna, 2019). At the same time, numerous studies show that returning to employment after serving a sentence is correlated with a low risk of recidivism (Kivsgaard, 1989; Skardhamar, Telle, 2009; Uggen, 2000).

Over the past decade, the regulation of access to criminal records—and both the regulated and unregulated use of criminal-record data in personal records—has undergone significant changes in European countries (Stefanou, Xanthaki, 2008). Entries from an individual’s criminal-history file are today available to a greater number of employers than ever before, and the number of requests for the provision of criminal-record information has, over the relevant period, increased tenfold. This trend of expanded access and use can be traced in Sweden as early as 2001, when it first became mandatory for employers to check the criminal records of teachers and childcare workers prior to engagement (Buschmann, 2002). Similar legal acts and regulations—enabling, and even requiring, employers to access information on job applicants’ criminal history either directly or through so-called certificates of conduct—have, over the past decade, been adopted in several other countries as well, including Germany (Morgenstern, 2011), the Netherlands (Boone, 2011), the United Kingdom (Thomas, 2007), and the United States (Jacobs, 2006). In general, the new legislation has highlighted employers’ concerns regarding employees who work, for example, with children, older persons, persons with disabilities, and other groups regarded as vulnerable (Boone, 2011; Thomas, 2007). By way of illustration, in the United Kingdom, background checks for childcare workers became mandatory as early as 1986, following what researcher Thomas termed the “discovery of child sexual abuse” in connection with the Colin Evans case (Thomas, 2007). By contrast, in Norway, the so-called Bjorn case in the early 1990s led to a new act introducing mandatory national criminal-record checks for childcare staff and teachers (Backman, 2012). Following practical examples (criminal attacks) in Norway, the United States likewise, in 2001, made mandatory criminal-record checks for childcare workers and teachers (Skivenes, 2011). Although this is not entirely new at the international level, the introduction of the 2001 law marked the beginning of a new era for childcare workers and teachers in Scandinavian countries and many others, signalling a break with prior thinking about employers’ access to criminal records and the privacy rights of former offenders (Backman, 2011).

Only ten years later (at the end of 2011), employers were required to check the criminal records of prospective personal assistants for children and of staff working in homes providing care and accommodation for children and youth (Galantowicz et al., 2010). Schools were likewise required to do so for pupils whose programmes included a practical-training component in schools or preschool institutions; the requirement was even extended to owners of companies conducting motor-vehicle inspections together with insurance intermediaries (Howard, 1974), as well as to all persons applying for a licence to practise one of the regulated health professions (Carlin, Frick, 2013).

Moreover, toward the end of the second decade of the third millennium, the extent to which a subject gains access—i.e., exercises a right introduced by the Criminal Records Act—has been continuously expanding at the expense of the rights of prospective employees (Lam, Harcourt, 2003). At the same time, these legislative changes have also opened the door to a practice known as “compelled subject access”, whereby employers who lack a legal right to request disclosure of criminal-record information from prospective employees nevertheless compel them to submit a criminal record report (Lyngstad, Skardhamar, 2011). Research results confirm this trend: in Scandinavian countries, the number of employer requests for access to criminal-record information—and the submission of criminal record reports by prospective employees applying to job competitions—increased from approximately 10,000 in a single year at the end of the twentieth century to more than 160,000 annually in the second decade of the third millennium, with a steady upward trajectory (Backman, 2012; Rikspolisstyrelsen, 2004).

In Serbia, the criminal record report is regulated by Article 102 of the Criminal Code ("Official Gazette of the Republic of Serbia", Nos. 85/2005, 88/2005—corr., 107/2005—corr., 72/2009, 111/2009, 121/2012, 104/2013, 108/2014, 94/2016, 35/2019, and 94/2024). As Lazarević argues, “the justification for the existence of data on an individual’s convictions is not disputed. This is, the same author believes, on the one hand in the public interest, but also in the interest of the individual, if they find themselves in a situation where, in exercising a right, they must prove that they have not been convicted” (Lazarević, 2006). It is important to note that the legal provision governing the disclosure of data from the criminal records provides that “no one has the right to demand that a citizen submit proof of their conviction or non-conviction” (Criminal Code of the Republic of Serbia, Article 102, para. 4). In paragraph 3 of the same Article, the legislator provides that data from the criminal records may, upon a reasoned request, be provided to a state authority, an enterprise, another organisation, or an entrepreneur, provided that the legal consequences of the conviction or the security measure are still in effect and that there is a justified interest based on law. From the foregoing, it may be concluded that an employer may not require an individual to submit their own criminal record report when filing an application to a job competition for employment; however, the same provision simultaneously enables the employer to request, from the competent criminal-records authority, a criminal record report for the applicant to the job competition.

It should be noted that the legislator introduces here two important elements: first, that data on an individual’s conviction may be disclosed only while the

legal consequences of the conviction or the security measure remain in force; and second, that there must be a justified interest grounded in law, which the requester must substantiate when submitting the request. Notwithstanding the prevailing view in the literature that paragraph 4 of Article 102 erects a barrier against the established practice of requiring citizens, when exercising a right, to submit proof of conviction or non-conviction, this nevertheless does not constitute an obstacle—there has been a reversal of roles—because a potential employer no longer has to demand that an applicant in a job competition submit a criminal record report; rather, by submitting a reasoned request to the competent authority maintaining the criminal records database, the employer may request it directly. It is also significant to note that, with respect to the issuance of a criminal record report for an individual by the competent authority, it is irrelevant whether the conviction has been expunged. As Lazarević observes, “...this means that the subjects recognized by the norm as potential users of the criminal record report may be provided with both types of data—regardless of whether the conviction has been expunged; that is, the requester will obtain both types of information, which indicates that rehabilitation, both statutory and judicial, has no effect on the disclosure of data from the criminal records” (Lazarević, 2006). The conclusion that may be drawn is that the legislator has left it to the employer to decide whether to request the procurement of a criminal record report for a job-applicant. Pursuant to the provisions of the Law on Personal Data Protection in Serbia, it may be observed that, when procuring a criminal record report for an individual who has submitted a job application, a third party is present—a person who, under Article 4(1)(11) (“Official Gazette of the Republic of Serbia”, No. 87/2018), “is a natural or legal person, i.e., a public authority, who is neither the data subject, nor the controller or processor, nor a person authorized to process personal data under the direct supervision of the controller or processor”—namely, a person who, under Article 102 of the Criminal Code, has grounds to submit a request to obtain criminal-record data for the individual who has applied to a job competition. Furthermore, it may be established that Article 9 of the Law on Personal Data Protection in Serbia, “Differentiation among certain categories of data subjects”, Article 9(1)(3) (“Official Gazette of the Republic of Serbia”, No. 87/2018), defines a category of persons whose data are processed—persons convicted of a criminal offence—while Article 19 (“Official Gazette of the Republic of Serbia”, No. 87/2018), “Processing related to criminal convictions and criminal offences”, provides that “processing of personal data relating to criminal convictions, criminal offences, and security measures may be carried out on the basis of Article 12(1) of this Act (“Official Gazette of the Republic of Serbia”, No. 87/2018) only under the supervision of the competent authority or,

if processing is permitted by law, subject to the application of appropriate specific measures to safeguard the rights and freedoms of data subjects. A single register of criminal convictions shall be maintained exclusively by, and under the supervision of, the competent authority” (“Official Gazette of the Republic of Serbia”, No. 87/2018).

From the foregoing, it is established that there exists a lawful basis for establishing records, collecting, storing, and processing personal data, managing such data, and making it available, specifically in the segment relating to data on criminal convictions and criminal offences. It is important to note that there is also a so-called negative determination of the obligation to obtain extracts from the criminal records and from records of initiated and ongoing investigations, as is the case, for example, in the Law on Higher Education (“Official Gazette of the Republic of Serbia”, No. 88/2017, 73/2018, 27/2018, 67/2019, 6/2020, 11/2021 (authentic interpretation), 67/2021, 67/2021, 76/2023, and 19/2025). Thus, the procurement of extracts from the criminal and investigative records is not required; instead, with respect to the criminal record extract for an individual, the legislator has set, as a condition for restricting the performance of an activity, the following rule in the section “Staff of higher education institutions—teaching and non-teaching staff”, Article 72: “A person who has been convicted by a final judgment of a criminal offence against sexual freedom, forgery of a document issued by a higher education institution, or acceptance of a bribe in the performance of duties in a higher education institution may not acquire the title of teacher, i.e., assistant” (“Official Gazette of the Republic of Serbia”, No. 88/2017, 73/2018, 27/2018, 67/2019, 6/2020, 11/2021 (authentic interpretation), 67/2021, 67/2021, 76/2023, and 19/2025). By this approach, the legislator has indirectly introduced the institution of mandatory procurement of the document—an extract from the criminal and investigative records—for an applicant to a competition for election to an academic title and for the establishment of employment at a higher education institution.

The results of the comparative analysis indicate that the legislator in Serbia has adopted a methodology of enumerating the authorities and entities that may submit a reasoned request to obtain an extract from the criminal records for a person who has applied to a job competition, which differs from the approach taken by legislators in other European countries. In those jurisdictions, legislation typically enumerates: (i) the jobs for which the employer (authority, entity, etc.) must, as part of the recruitment process, obtain an extract from the criminal records for the applicant; (ii) the jobs for which, at the moment of submitting an application, the employer (the party that has announced the job

competition) may not request a criminal record extract; and (iii) the jobs for which the employer decides, at its discretion, whether to submit a request to obtain a criminal record extract for the person who has applied to the job competition.

The results of the empirical research indicate that, over the past three decades in Serbia, more than three million persons have been reported for having committed a criminal offence, which has automatically resulted in the lawful establishment of a criminal-record file that remains permanently present in an individual's life until their death. For certain occupations, when descendants of a deceased person apply to a job competition, the content of the deceased person's criminal file may extend to the descendants. The foregoing indicates that, on a ten-year basis, more than one million persons are reported for committing a criminal offence, which implies that, over that period, 13% of persons out of the total population may have some form of criminal record (operational/police, criminal, investigative). On the other hand, an even more significant research finding indicates that, over three decades, more than one million persons were convicted by court decision, which means that, over ten years, more than three hundred and thirty thousand persons were convicted by court decision, or approximately thirty thousand persons on an annual basis (stat.gov.rs), thereby establishing a criminal file. The foregoing leads to the conclusion that a portion of working-age human resources in Serbia may, due to the existence of a criminal (criminal-record) file, encounter barriers to employment, if the employer that has announced a job competition for the recruitment of human resources submits a written, reasoned request to the competent authority to obtain a criminal record report for the persons who have submitted an application to the job competition.

Conclusion

So-called criminal justice reforms commonly referred to as the “second chance” agenda are currently gaining increasing momentum. Second-chance reforms in the criminal justice context refer to efforts aimed at alleviating the difficulties faced by former prisoners after serving a custodial sentence and being released.

The movement began in many countries with the adoption of so-called Second Chance laws, which sought to address many of the issues faced by individuals who, after serving a custodial sentence, attempt to reintegrate into society. Although second-chance reforms may include measures such as expungement statutes—expungement being one of the ways in which states worldwide seek to mitigate the collateral consequences affecting individuals with criminal records in the context of employment—research results indicate that, at an

employer's request, data may be disclosed regarding both expunged and non-expunged convictions.

In today's internet era, record expungement is imperfect. With the development of the internet and of social networks and media, there is no way to eliminate all traces of the underlying event. Moreover, the internet, as a host of vast democratic forums, limits the effectiveness of orders to expunge criminal records. There is no guarantee that merely removing an individual's name from an official database will render their reputation free from stigma associated with arrest information. Even if a person takes the time to have their record expunged and pays the requisite court fees, this may have no effect whatsoever on an employer's ability to discover their criminal record.

The findings unequivocally indicate that, through their legal instruments, states not only permit access to an individual's criminal file but increasingly expand the sectors of activity in which they require—either expressly or implicitly—the mandatory procurement of a criminal record report for persons applying to a job competition.

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IZVEŠTAJ IZ KAZNENE EVIDENCIJE I LJUDSKI RESURS

Apstrakt

Zaposlenje je jedna od najvažnijih koraka koje osoba preduzima kako bi obezbedila sebi višeznačnu stabilnost života, a jedna od prepreka ostvarenju tog cilja je dosije kriminalne istorije—dosije krivične evidencije. Izveštaj iz kaznene evidencije u razvoju ljudskih resursa i određenju opsega njihovog profesionalnog zaposlenja ima značajno mesto. Prateći vododelnicu između navednih instituta u literaturi i stručnoj praksi, predmet istraživanja je korelacija između: izveštaja iz kaznene evidencije i ljudskog resursa. Cilj istraživanja je da primenom naučnih metoda: analize sadržaja postojećih rezultata istraživanja—naučnih dostignuća i stručne prakse, istorijske, kvantitativne i kvalitativne analize, komparacije, korelacije, deskripcije i sinteze, prikaže opseg dejstva isprave—izveštaja iz kaznene evidencije na ljudski resurs, koji ima kriminalnu istoriju—krivični dosije kod podnošenja prijave na konkurs sa ciljem zaposlenja. Kako rezultati istraživanja pokazuju, izveštaj iz kaznene evidencije kod prijave ljudskog resursa na konkurs za zaposlenje proizvodi kolateralnu posledicu—osoba u najvećem broju slučajeva odmah na samom početku prilikom dostavljanja prijave na konkurs biva sprečena da nastavi dalje kretanje u postupku sprovođenja konkursnih radnji. Rezultati takođe pokazuju da dok se ulažu napor da se pruži druga šansa osuđenim osobama, istovremeno se povećava broj zahteva za Izveštajima iz kaznene evidencije pri zaposlenju.

Ključne reči: *izveštaj iz kaznene evidencije, ljudski resursi, konkurs, posao.*

JEL: *K14, K31, J71.*

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MACROECONOMIC AND BANK-SPECIFIC DETERMINANTS OF NET INTEREST MARGINS: EVIDENCE FROM SERBIA

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Original Article

Abstract

This paper examines the determinants of the net interest margin (NIM) of banks in Serbia during the period 2007–2023. The analysis includes indicators reflecting banking-sector conditions and selected macroeconomic variables as independent variables, while NIM is treated as the dependent variable. Using panel regression analysis, the study identifies the key determinants affecting the net interest margin of banks operating in the Republic of Serbia. The results indicate that macroeconomic factors significantly influence NIM. The key policy interest rate has a positive effect, while the exchange rate has a negative effect on NIM. Among banking sector variables, bank size and the loan-to-deposit ratio show a statistically significant negative impact, whereas the Lerner index, as a measure of market power, has a positive effect. Other variables are not statistically significant.

Key words: *determinants, net interest margin, banks, Republic of Serbia*

JEL: *G21, E43*

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Introduction

Net interest margin (NIM) is a widely used measure of bank profitability, defined as the ratio between net interest income and selected categories of assets reported in the balance sheet of an individual bank or the banking sector as a whole. When data availability is not a limitation, NIM can alternatively be expressed as the ratio of the aforementioned difference to interest-earning assets, which more accurately reflects the efficiency of the banking industry related to traditional credit-deposit intermediation. However, due to data constraints, research in practice more commonly defines NIM in relation to total assets.

Net interest margin indicates the efficiency of asset and liability management. Moreover, it serves as an indicator of the broader economic and regulatory situation in which banks operate. Understanding the factors that influence net interest margin is essential for decision makers, regulators and financial institutions themselves, especially in conditions of high interest rate volatility.

Determinants of NIM can be internal, which reflect banks' operations, and external, which reflect the macroeconomic and institutional environment (Nuhiu et al., 2024; Kosumi & Zharku, 2024; Rossi et al., 2024). Despite the extensive literature on this topic, differences in identified determinants among countries and regions point to the need for deeper analyses that take into account the specific characteristics of national banking sectors. This paper examines the key factors that shape banks' net interest margins in the Republic of Serbia, using panel regression analysis.

The domestic banking sector has had important structural changes in the past decades, including the process of transition, privatization and adaptation to the EU's regulatory framework. Furthermore, due to the coordinated reaction to global economic disturbances, part of this period was also marked by unusually low interest rates. In such an environment, the analysis of factors affecting net interest margin gains additional importance. Special emphasis will be on the time span after the global financial crisis to analyze the resilience and adaptation of banks under conditions of reduced profitability, environmental change, and regulatory demands. Research results can help understand the margin structure in the Serbian institutional context and provide a basis for policies aimed at improving the banking system's efficiency and stability. The paper includes three main parts. The first is a literature review on the determinants of net interest margin. This is followed by the data analysis, a detailed description of the methodology, and a discussion of results. The final section offers concluding considerations.

Literature review

The determinants of banks' net interest margin have been the subject of numerous theoretical and empirical studies, given the importance of this indicator for assessing the profitability and efficiency of the banking sector. The basic theoretical model for analyzing the net interest margin was developed by Ho and Saunders (1981). This model (known as the dealership model) sees the bank as an intermediary between depositors and borrowers, attempting to avoid exposure to risk as much as possible. It is assumed that in choosing the structure of its loans and the sources of funding for those loans, the bank aims to insulate (isolate) itself from the effects of risk—this is known as the hedging hypothesis. The underlying assumption is that aligning the weighted average maturities of financial assets and liabilities allows banks to avoid potential reinvestment and refinancing risks that would otherwise result from differences in their respective maturity profiles. The risk identified by the model is the interest rate risk arising from changes in interest rates. Liquidity risk—which can be a practical consequence of maturity mismatches between assets and liabilities—is not specifically analyzed, as the model assumes that reinvestment and refinancing will always be available, albeit under suboptimal conditions. Thus, liquidity risk is essentially reduced to interest rate risk. To give the model a more elegant mathematical form, simplifications were necessary, and many of the risks that banks face in practice were abstracted from the model.

Net interest margin points to the bank's operational efficiency and the impact of competition on two traditional banking markets: the deposit and loan markets. To a large extent, NIM is a parameter that the bank sets as its target when they want to cover all the risks and costs that arise in financial intermediation (Obeid, 2024). Banks pursue target efficiency by applying various business strategies. One way is to operate with the maximum possible spread between lending and deposit interest rates. Nonetheless, competition limits banks' ability to increase operational efficiency in this way. Therefore, it can be concluded that NIM optimization is nothing more than the response of each individual bank to prevailing market conditions. The level of NIM is influenced by both interest rate policy and the structure of assets and liabilities available to the bank, with a mutual interdependence existing between these two factors.

Maintaining an adequate net interest margin is essential for generating income that allows banks to build up capital buffers in response to higher risk exposure. (Angbazo, 1997, p. 56). For that reason, in empirical research on net interest margins, various determinants pointing to the degree of risk exposure often appear as potentially statistically significant. These include, for example, credit

risk (Wong, 1997; Angbazo, 1997), liquidity risk, the degree of financial leverage, operating costs, bank size, non-interest income, and others.

Banks set the margins taking into account the following factors: level of risk aversion and market competition, bank size and interest rate volatility. Many studies employ cross-country samples to explore whether common factors influence margin formation across different banking systems. Table (1) shows the studies relevant for this paper.

Table 1. Review of empirical studies

Papers	Research sample	Main determinants	Key contribution
Saunders & Schumacher (2000)	6 developed and 6 developing countries, 1988-1995, bank-as-intermediary model	Regulatory factors, market structure, risk	Risk is a key determinant of NIM; margins are higher in countries with less stable financial systems
Drakos (2002)	Central and Eastern Europe, 1993-1999, DEA and regression	Efficiency, foreign bank entry, concentration	Foreign bank entry reduces NIM in transitional economies
Maudos & Fernández de Guevara (2004)	EU (15 countries), 1993-2000, panel regression	Operating costs, competition, risks	Decline in European banking system margins due to reduced interest rate risk, credit risk, and operating costs, despite increased market power and concentration
Claeys & Vander Vennet (2008)	Central and Eastern Europe vs. Western Europe, 1993-2000, panel regression	Competition, ownership, costs, capital	An increase in competition and the inflow of foreign capital tend to reduce the net interest margin (NIM) Increased competition and foreign capital entry reduce NIM
Hawtrey & Liang (2008)	OECD, 1989-2001, panel regression	Risk, bank size, competition	Greater competition and bank size reduce margins, while risk increases it
Männasoo (2013)	Estonia, 1998-2011, panel regression	Efficiency, competition, risk, bank size	Greater competition and efficiency reduce margins; risk and operating costs increase it
Marinković & Radović (2014)	Serbia, 2008-2012, panel regression	Ownership structure, bank size, credit risk	Banks with a higher equity-to-assets ratio have higher NIM, while credit risk is in

			negative correlation with NIM
Plakalović & Alihodžić (2015)	Bosnia and Herzegovina, 2008-2013, multiple linear regression	GDP, inflation, liquidity risk, credit risk	Economic expansion reduces NIM, while liquidity, credit risk and operating costs increase NIM
Ganić (2018)	Southeast Europe, 2006-2015, panel regression	Inflation, GDP, credit growth, capital	Inflation and credit growth increase NIM, GDP growth decreases NIM
Bustos-Contell et al. (2019)	Banks in the EU, 2000–2015, panel regression	Credit risk, capitalization, inflation, GDP growth, competition	Before the crisis, macroeconomic factors had more influence; after the crisis, risk and capitalization became more significant
Todorović et al. (2024)	Southeast Europe, 2012–2021, OLS regression	Exchange rate, interest rate, concentration, sector size	Domestic currency depreciation, interest rate growth, concentration and sector size lead to higher NIM

Empirical literature differs in geographical focus and methodological approach. However, most papers single out similar groups of determinants: selected features of the national banking system, macroeconomic and institutional determinants. So, the most commonly used are: bank size (larger banks often achieve lower margins due to economies of scale), efficiency (higher operational efficiency is associated with lower costs and higher margins), credit risk (higher risk requires a higher premium embedded in interest rates), and the structure of funding sources (banks that rely more on expensive sources of capital tend to have higher margins). Among macroeconomic and institutional variables, the most frequently cited determinants of NIM include: inflation (higher inflation often leads to higher margins due to a greater uncertainty premium), gross domestic product (higher economic activity usually contributes to lower margins as credit risk and unit service costs decrease), regulatory framework and the degree of financial liberalization (more restrictive regulation can increase operating costs and affect margins), and market structure, i.e., the level of competition (in oligopolistic structures, banks have the ability to set higher margins, while the presence of foreign banks can increase competition and reduce margins of domestic banks) (Ristić et al., 2023).

Recent studies have continued to explore the determinants of net interest margins in the context of prolonged low interest rate environments and structural changes in banking systems. For instance, Borio et al. (2017) and

Claessens et al. (2018) emphasize the role of monetary policy conditions and bank business models in shaping interest margins. More recent research highlights the importance of market power, regulatory environment and macroeconomic volatility for margin formation in both developed and emerging banking systems.

Männasoo (2013) analyzes the determinants influencing the NIM of banks in Estonia from 1998 to 2011. The independent variables are: market structure, interest rate volatility, efficiency, liquidity, and credit risk. The research results confirmed that NIM is primarily determined by risk and the market structure of the banking sector. Bustos-Contell et al. (2019) conduct a study to identify the determinants of NIM for banks operating in Spain from 1985 to 2015. The analysis confirm that macroeconomic determinants have a more significant impact before the crisis, while industry-specific determinants are more influential after the crisis.

Among papers analyzing the determinants of net interest margin of banks operating in several countries, we single out research by Saunders & Schumacher (2000) who use a sample of 614 banks operating in six selected European countries and the USA from 1988 to 1995. The results show that regulatory factors, such as limits on deposit interest rates, required reserves and capital adequacy ratios, have a significant impact on NIM. Also, segmentation and restrictions within the banking system increase the existing banks' monopoly power, leading to higher margins. Macroeconomic volatility of interest rates also significantly affects NIM, suggesting that policies aimed at reducing that volatility may reduce bank margins. Drakos (2002) examines the banking sector's efficiency in Central and Eastern European countries during the transition period and analyzes the impact of foreign bank entry on net interest margins. The analysis covers 185 banks from transition countries, including Bulgaria, the Czech Republic, Hungary, Poland, Romania and Slovakia, in the period from 1993 to 1999. The results of the panel analysis show that foreign bank entry decreased NIM in the observed transition countries during the analyzed period.

Maudos & Fernández de Guevara (2004) examine the factors influencing net interest margins in major European Union banking markets over the period 1993–2000. They find that operating costs and risk levels played a significant role. Despite widespread mergers and acquisitions during this time, reductions in operational costs and lower interest and credit risks offset the potential increase in NIM, suggesting that market structure and competition alone could not fully explain changes in NIM.

Hawtrey and Liang (2008) examine the determinants of net interest margins across the banking sectors of fourteen OECD countries over the period 1987–2001. Their results indicate that both bank scale and managerial performance exert a significant negative influence on NIM, whereas factors such as market power, risk aversion, interest rate volatility, credit risk, the opportunity cost of holding liquid assets and implicit interest have a positive and significant effect. Managerial efficiency is defined as the ratio of operating expenses to gross income, where lower efficiency corresponds to narrower margins. Bank size is measured as the logarithm of total loan volume, where larger loan portfolios reduce unit costs due to economies of scale, ultimately resulting in narrower interest margins.

Kasman et al. (2010) conducted the analysis on a sample of selected countries from Central and Eastern Europe between 1995 and 2006. Their study compares banks in countries that recently joined the EU, such as Malta and Cyprus, with banks operating in candidate countries including Croatia, Macedonia, and Turkey. The authors intend to check the impact of consolidation of the banking sector, and thus distinguish two observation periods: the first, from 1995 to 2000, and the second, from 2001 to 2006. In the first analyzed period, most industry-specific and market variables confirm a positive impact on NIM. In the second period, the influence of macroeconomic variables diminished due to reduced disparities among the analyzed countries, which led to an increased importance of industry-specific variables. Among them, capital adequacy confirms its significance in old, but not new, EU members, while the concentration index emerges as an important determinant of NIM in both sets of countries, although the effect operated in opposite directions.

In the context of Serbia and the Western Balkans, research is still relatively limited. Marinković and Radović (2014) analyze the determinants of net interest margin in the Serbian banking sector. They use panel regression analysis to check the influence of the characteristic features of individual banks, the banking sector and macroeconomic determinants on NIM, in the context of different ownership structures and bank sizes. The results indicate that macroeconomic determinants do not have a significant effect on the margin when banks operating within the same economic and institutional environment are considered as statistical units. When it comes to industry-specific variables, the analysis confirms that banks with a higher equity-to-assets ratio record higher net interest margins. Regarding the impact of credit risk, their research points to the opposite, i.e. negative relationship with NIM. Of industry-specific indicators, market concentration is a significant factor, with the expected direction of influence. Additional importance of this paper comes from

the analysis of differences in NIM between banks of different sizes and ownership structures. The findings indicated that larger and foreign banks exhibit superior risk management efficiency. Plakalović and Alihodžić (2015) analyze the determinants of net interest margin of banks in Bosnia and Herzegovina from 2008 to 2013. Using a multiple linear regression model, the authors analyze the impact of macroeconomic and microeconomic determinants on NIM. Their findings confirm a negative relationship between macroeconomic determinants (gross domestic product growth and inflation) and net interest margin, while industry-specific variables (liquidity risk, credit risk and operating costs) confirm a positive relationship with NIM. Todorović et al. (2024) analyze the determinants of net interest margin in the banking sectors of Southeast Europe during the period from 2012 to 2021. Their results indicate that both the cost of capital in real terms and currency fluctuations, along with bank sector magnitude and degree of market concentration, are positively associated with NIM. In contrast, variables such as GDP, inflation, capitalization, liquidity and credit risk are found to have no statistically significant impact. In a somewhat different methodological framework, Marjanović et al. (2023) use DEA and the Tobit regression method in a similar period to look at banks in Serbia as statistical units, and find a negative impact of high market concentration of the banking sector, GDP and financial crisis, while inflation is a variable with a positive influence on bank efficiency.

Methodology and discussion

Given that the objective of this paper is to analyze the impact of the determinants of banks' net interest margin in the Republic of Serbia from 2007 to 2023, we focus on selected industry-specific and macroeconomic indicators (Table 2).

Table 2. Description of key indicators

Variable	Name	Definition
Net interest margin	nim	Ratio of net interest income and total assets
GDP per capita	gdppc	GDP per capita
Inflation	inflation	Year-on-year price growth
Exchange rate	exchangerate	Exchange rate change of RSD in relation to EUR
Interest rate	ris	Annual key policy interest rate of the NBS
Concentration in the banking sector	concentration	Herfindhal-Hirschman concentration index
Bank size	size	Logarithm of total assets
Credit risk	creditrisk	Ratio of nonperforming loans to total loans
Operational efficiency	oer	Ratio of operating expenses to operating income

Loan-to-deposit ratio	ldr	Ratio of total loans to total deposits
Lerner Index	lerner	(total income - total expenses) / total income
Asset provisions	assetprovisions	Ratio of provisions to total assets

The Lerner index is used as a proxy for banks’ market power and reflects the ability of banks to set prices above their costs. Higher values of the index indicate greater market power and lower competitive pressure in the banking sector. In this study, the index is calculated using accounting data on banks’ total income and total expenses, as presented in Table 2, which represents a commonly applied approach in empirical banking research.

The research sample includes 20 banks (n=20): 3 Banka, Addiko banka, Adriatic banka, AIK, ALTA, API, Banca Intesa, Bank of China Srbija, Poštanska štedionica, Erste Bank, Eurobank Direktna, Halkbank, MIRABANK, NLB Komercijalna banka, OTP, ProCredit Bank, Raiffeisen Banka, Srpska Banka, Unicredit Bank and Yettel Bank in the period from 2007 to 2023 (t=17). The panel is not balanced, as some banks do not have data for the entire time span. Data were obtained from the National Bank of Serbia’s website. The following graph shows banks’ net interest margin trend in the observed period.

Diagram 1: NIM trend in the selected Serbian banks in the period 2007-2023



Source: NBS, authors, https://www.nbs.rs/sr_RS/finansijske-institucije/banke/bilans-stanja (accessed on 10 April 2025)

Note: 1-3 Banka, 2-Addiko banka, 3-Adriatic banka, 4-AIK, 5-ALTA, 6-API, 7-Banca Intesa, 8-Bank of China Srbija, 9-Poštanska štedionica, 10-Erste Bank, 11-Eurobank Direktna, 12-Halkbank, 13-MIRABANK, 14-NLB Komercijalna banka, 15-OTP, 16-ProCredit Bank, 17-Raiffeisen Banka, 18-Srpska Banka, 19-Unicredit Bank i 20-Yettel Bank

The data analysis was conducted using Stata 12. Table 3 presents the descriptive statistics of the variables.

Table 3. Data summary

Variable		Mean	SD	Min	Max	N
nim	Overall	0.044	0.028	-0.061	0.138	321
	Between		0.021	0.007	0.113	20
	Within		0.019	-0.028	0.140	16.05
gdppc	Overall	6886.358	1494.143	5359.840	10895.180	321
	Between		300.878	6837.938	8059.419	20
	Within		1479.983	4767.933	10943.600	16.05
inflation	Overall	5.902	4.324	1.300	15.100	321
	Between		0.309	4.644	5.965	20
	Within		4.317	1.238	16.358	16.05
exchangerate	Overall	1.023	0.044	0.960	1.118	321
	Between		0.009	0.993	1.026	20
	Within		0.043	0.957	1.117	16.05
ris	Overall	6.751	4.371	1.000	17.750	321
	Between		1.120	3.179	6.941	20
	Within		4.299	0.810	17.751	16.05
concentration	Overall	765.100	109.249	578.000	986.000	321
	Between		26.720	760.235	852.429	20
	Within		107.608	582.864	990.864	16.05
size	Overall	17.861	1.421	14.342	20.646	321
	Between		1.335	15.531	19.993	20
	Within		0.638	15.698	20.138	16.05
creditrisk	Overall	1.080	19.070	0.000	340.629	319
	Between		4.481	0.001	20.050	20
	Within		18.531	-18.968	321.659	15.95
oer	Overall	0.052	0.048	0.009	0.560	321
	Between		0.025	0.019	0.126	20
	Within		0.041	-0.026	0.532	16.05
ldr	Overall	1.910	12.472	0.000	183.268	319
	Between		4.607	0.460	19.071	20
	Within		11.958	-16.573	173.483	15.95
lerner	Overall	-0.796	4.789	-67.491	3.197	315
	Between		2.246	-9.213	0.527	20
	Within		4.422	-63.954	6.550	15.75
assetprovisions	Overall	0.005	0.009	0.000	0.131	321
	Between		0.004	0.000	0.018	20
	Within		0.009	-0.012	0.119	16.05

Source: Authors

Certain variables exhibit relatively large ranges, particularly credit risk, loan-to-deposit ratio and the Lerner index. These extreme values may be attributed to

differences in banks' balance sheet structures, as well as to specific episodes during the observed period when some banks experienced unusually low profitability or temporary losses, which affected the calculated values of certain indicators.

With the aim of testing the impact of selected industry-specific and macroeconomic variables on NIM, we employ panel regression. The dependent variable is *nim*.

In our analysis, the Hausman test results ($\chi^2(6) = 3.44$, $p = 0.752$) fail to reject the null hypothesis, suggesting that the random-effects model is more suitable. The Breusch-Pagan LM test assesses whether there is no unit-specific variance, i.e. whether the simple OLS model adequately captures the data structure. The test outcome ($\chi^2(1) = 715.28$, $p < 0.001$) rejects the null hypothesis, confirming the presence of panel effects.

Model diagnostics involve several tests. The Fisher-type test indicates that GDP per capita (*gdppc*), inflation, exchange rate, concentration and size are non-stationary and therefore require first-order differencing. To assess residual normality, kurtosis and skewness tests for panel data are applied. The findings are summarized in Table 4.

Table 4. Test of normality of residuals

	Coefficient	Bootstrap SE	z	p	95% confidence interval	
					Lower bound	Upper bound
Skewness of errors	-3.38e-06	2.43e-06	-1.39	0.164	-8.13e-06	1.38e-06
Kurtosis of errors	5.17e-07	2.30e-07	2.25	0.025	6.62e-08	9.68e-07
Skewness of residuals	8.65e-06	6.53e-06	1.32	0.185	-4.15e-06	0.00002
Kurtosis of residuals	5.49e-07	3.63e-07	1.51	0.130	-1.62e-07	1.26e-06

Source: Authors

Analysis of the distribution characteristics of errors and residuals shows that there are no statistically significant deviations from symmetry ($p > 0.16$ for all skewness estimates). However, the kurtosis coefficient of the error term is positive (coefficient = $5.17e-07$) and statistically significant ($p = 0.025$), which indicates that distribution of errors is more peaked than the normal distribution. The kurtosis of residuals is not statistically significant ($p = 0.130$), which shows that the residuals approximately follow a normal distribution.

The Wooldridge test for autocorrelation indicates the presence of serial dependence in the panel observations ($F(1, 19) = 10.294, p = 0.005$). The Breusch-Pagan/Cook-Weisberg test detects heteroskedasticity in the dataset ($\chi^2(20) = 9005.56, p < 0.001$). To assess potential multicollinearity, variance inflation factors (VIF) and tolerance values are calculated. All independent variables exhibit VIF values below 10 and tolerance values above 0.1, indicating no serious multicollinearity. Finally, cross-sectional dependence among banks is examined using the Pesaran test. The null hypothesis about the absence of cross-sectional dependence is not accepted ($CD = 4.622, p < 0.001$), which indicates dependence among banks. Based on the conducted tests, we opt for a random-effects model, and due to the interdependence between banks, we use Driscoll-Kraay estimator to correct standard errors. The Driscoll-Kraay estimator is applied in order to obtain robust standard errors that are consistent in the presence of heteroskedasticity, serial correlation and cross-sectional dependence. Since the diagnostic tests indicate the existence of autocorrelation, heteroskedasticity and cross-sectional dependence among banks, the Driscoll-Kraay correction provides more reliable inference compared to conventional random-effects estimators. Table 5 shows the results of the analysis.

Table 5. Random-effects GLS regression with Driscoll-Kraay standard errors

	β (95% CI)	SE	p
dgdppc	-2.05e-06 (-4.62e-06, 5.14e-06)	1.20e-06	0.109
dinflation	-0.00025 (-0.00069, 0.00018)	0.00021	0.273
dexchangerate	-0.04727 (-0.06489, -0.02966)*	0.00826	<0.001
ris	0.00254 (0.00226, 0.00282)*	0.00013	<0.001
dconcentration	-0.00003 (-0.00008, 0.00002)	0.00002	0.248
dsize	-0.01295 (-0.02296, -0.00293)*	0.00470	0.015
creditrisk	-0.03812 (-0.17411, 0.09786)	0.06380	0.559
oer	0.04137 (-0.08465, 0.16739)	0.05913	0.495
ldr	-0.00002 (-0.00003, -2.74e-06)*	7.08e-06	0.024
lerner	0.00052 (0.00022, 0.00082)*	0.00014	0.002
assetprovisions	-0.12496 (-1.12398, 0.87405)	0.46870	0.793
const	0.02955 (0.02076, 0.03834)*	0.00412	<0.001
N	295		
$\chi^2(11)$	1904.86		
p	<0.001		
R ²	0.268		

* $p < 0.05$

Source: Authors

The regression equation is as follows:

$$\text{nim} = 0.02955 - 2.05 \cdot 10^{-6} \cdot \text{dgdppc} - 0.00025 \cdot \text{dinflation} - 0.04727 \cdot \text{dexchangerate} + 0.00254 \cdot \text{ris} - 0.00003 \cdot \text{dconcentration} - 0.01295 \cdot \text{dsize} - 0.03812 \cdot \text{creditrisk} + 0.04137 \cdot \text{oer} - 0.00002 \cdot \text{ldr} + 0.00052 \cdot \text{lerner} - 0.12496 \cdot \text{assetprovisions}$$

The model is significant ($\chi^2(11) = 1904.86$, $p < 0.001$). Together, the variables explain 26.8% of the variance in the dependent variable ($R^2 = 0.268$). Significant predictors of the dependent variable are: Exchange rate change (dexchangerate) ($\beta = -0.04727$, 95% CI = [-0.06489, -0.02966], $p < 0.001$); Key policy interest rate (ris) ($\beta = 0.00254$, 95% CI = [0.00226, 0.00282], $p < 0.001$); Change in bank size (dsize) ($\beta = -0.01295$, 95% CI = [-0.02296, -0.00293], $p = 0.020$); Loan-to-deposit ratio (ldr) ($\beta = -0.00002$, 95% CI = [-0.00003, -2.74e-06], $p = 0.020$) and Lerner Index (lerner) ($\beta = 0.00052$, 95% CI = [0.00022, 0.00082], $p = 0.002$).

It should be noted that several variables (GDP per capita, inflation, exchange rate, concentration and bank size) are included in the model in their first differences. Therefore, the coefficients of these variables reflect the effect of changes in these indicators on net interest margin rather than their absolute levels. The interpretations of the coefficients are as follows. A one-unit increase in the annual change of the exchange rate (dexchangerate) is associated with a decrease in net interest margin (NIM) of approximately 0.047, holding other variables constant. A one-percentage-point increase in the key policy interest rate (ris) is associated with an average increase in NIM of about 0.0025, ceteris paribus. A one-unit increase in the annual change of bank size (dsize) is associated with an average decline in NIM of approximately 0.0129, holding other factors constant. A one-unit increase in the loan-to-deposit ratio (ldr) is associated with a decrease in NIM of about 0.00002, other variables remaining unchanged. Finally, a one-unit increase in the Lerner index (lerner) is associated with an average increase in NIM of approximately 0.0005, holding other variables constant.

Conclusion

This study employs panel regression analysis to determine the main factors influencing the net interest margin (NIM) of Serbian banks during the analyzed period. The results confirm the significant impact of macroeconomic variables, i.e. key policy interest rate and exchange rate, on NIM. An increase in the key policy interest rate has a positive impact on net interest margin, which is in line with expectations: higher reference rates signal banks to increase lending interest rates, thereby increasing income from loan placement. On the other hand, the depreciation of the domestic currency (weakening of the dinar)

negatively affects the margin, which may be a consequence of high borrowing costs and higher exchange rate risk in the banking sector.

Among banking sector characteristics, bank size is negatively correlated with net interest margin, suggesting that larger banks have lower margins, potentially due to more intense competition and lower reliance on interest income. The loan-to-deposit ratio (ldr) also demonstrates a negative effect, indicating that greater exposure to lending relative to collected deposits may contribute to a decline in the margin, either through increased funding costs or higher levels of risk. Lerner index has a significant and positive impact on the margin, which confirms that banks with greater market power, i.e. the ability to influence market prices, achieve higher net interest margins. Contrary to expectations, other analyzed variables, such as inflation, concentration index, credit risk, operational efficiency and asset provisions for asset losses (loan loss provisions), do not show a statistically significant impact on net interest margin in the analyzed sample.

The findings have several policy implications. Monetary authorities should be aware that changes in the policy rate and exchange-rate movements materially affect banking-sector margins. For bank managers, the results suggest that balance-sheet structure and market positioning remain important drivers of profitability.

This study is subject to several limitations. The analysis covers only Serbian banks and selected explanatory variables, while institutional quality, ownership structure and broader regulatory changes were not explicitly modeled. Future research may extend the sample to regional comparisons and dynamic panel techniques.

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MAKROEKONOMSKE I BANKARSKO-SPECIFIČNE DETERMINANTE NETO KAMATNIH MARŽI: EMPIRIJSKI DOKAZI IZ SRBIJE

Apstrakt

U radu se analiziraju determinante neto kamatne marže (NKM) banaka u Srbiji u periodu 2007–2023. U analizi se koriste pokazatelji koji odražavaju stanje u bankarskom sektoru i odabrane makroekonomske varijable kao nezavisne varijable, dok se NKM posmatra kao zavisna varijabla. Primenom panel regresione analize identifikovane su ključne determinante koje utiču na neto kamatnu maržu banaka koje posluju u Republici Srbiji. Rezultati pokazuju da makroekonomski faktori imaju značajan uticaj na NKM. Referentna kamatna stopa ima pozitivan uticaj, dok devizni kurs ima negativan uticaj na NKM. Među varijablama bankarskog sektora, veličina banke i odnos kredita i depozita imaju statistički značajan negativan uticaj, dok Lernerov indeks, kao mera tržišne moći, ima pozitivan uticaj. Ostale analizirane varijable nisu statistički značajne.

Ključne reči: *determinante, neto kamatna marža, banke, Republika Srbija*

JEL: *G21, E43*

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THE IMPACT OF TAX BURDEN LEVELS ON LONG-TERM ECONOMIC ACTIVITY

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Original Article

Abstract

This paper investigates the comparative long-term effects of tax burden levels on economic activity across developed and transitional European countries. The methodological approach is grounded in endogenous growth theory, which incorporates economic, social, and political variables to simulate the existence of a long-term relationship between tax policy and economic growth, with the aim of identifying recommendations for tax policy that support sustainable growth.

The assessment of the long-term relationship between tax burden levels and economic activity is conducted using annual data from balanced panel models covering 16 developed and 15 transitional European countries over the period 1995–2019. The analysis employs a dynamic panel model estimated via the Difference Generalized Method of Moments (GMM).

Empirical findings indicate that the impact of tax burden on long-term economic activity is nonlinear and statistically significant across both groups of countries. The results suggest that sustainable economic growth requires a reduction in tax burden levels.

Keywords: *tax burden, economic growth, panel model.*

JEL: *H21, O43, C23.*

Introduction

Tax policy refers to a system of public policies aimed at generating state budget revenues through defining choices regarding the level of tax burden (the level of tax revenues) and the subject of taxation (the structure of tax revenues). By

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making decisions on the level and structure of tax revenues, the state directly influences the level of economic activity and the decisions of economic agents, thereby determining in the long run the values of basic macroeconomic aggregates on which the performance of the national economy is based. The extent to which tax policy affects economic growth, represented as a continuous process of improving the national economy's ability to produce goods and services, is determined by the magnitude of the distortions created by taxes, which are manifested as a net loss of social welfare due to changes in relative prices and efficiency in the use of resources by the state.

The last two centuries of intensive development of nation-states have been marked by a continuous increase in the level of tax burden as a measure of social choice regarding the size and role of the modern nation-state, with simultaneous stable economic growth measured by the level of gross domestic product per capita. In the context of this fact, and the fact that tax revenues are the basis for the realization of state functions from its inception, the question arises about the role of tax policy in generating sustainable economic growth, that is, whether the economic growth of modern nation-states is due to the growth of total tax revenues (level of tax burden), or whether the achieved economic growth would have been greater if the tax burden had been lower or if the structure of tax revenues had been different.

Tax revenues represent a cost from the perspective of society, primarily caused by changes in relative prices due to taxation, that is, changes in the behavior of economic agents caused by changes in relative prices, and then by the efficiency with which the state uses collected tax revenues. However, the elimination of tax revenues, even as a theoretical concept, would have a far greater social cost compared to the reduction in social welfare – the cessation of the existence of the modern rule-of-law state, the disappearance of modern society, and the annulment of millennia of efforts aimed at building a civilization based on the rights and obligations of individuals and the state. Therefore, taxes are a necessity on which the modern state and modern society are based, and in the context of this fact and the state's efforts to maximize the level of social welfare, it is useful to determine the existence and nature of a possible long-term relationship between tax policy and economic growth, as one of the key segments of the social welfare function.

The subject of the research is a comparative analysis of the impact of tax policy on long-term economic growth in developed and transitional European countries, countries at different levels of economic, social, and political development (economic efficiency), through examining the impact of the first segment of tax policy, the level of tax burden, on the level of economic activity

in the long run (level effect). The issue of the impact of the structure of tax policy on the dynamics of long-term economic growth (growth effect), as the second component of tax policy, represents a significantly broader concept that deserves to be analyzed separately. (Lalić & Trifunović, 2026)

Literature Review

The tax system represents a process by which the state transfers a portion of the income of taxpayers (businesses, households, and individuals) into the state treasury for the purpose of financing public policies. The introduction of taxes leads to changes in the relative prices of production factors, goods, and services, whereby taxes cause the reallocation of resources, changes in the structure of consumption and production, and the composition of gross domestic product. Changes in relative prices, as the main channel through which taxes affect economic activity and economic efficiency, occur through the introduction of taxes, as well as through changes in the level of tax burden and the structure of tax revenues (Brunner and Meltzer, 1969; Sarel, 1995).

The introduction or increase of taxes places taxpayers in a worse position for two reasons: first, taxation reduces disposable income; second, taxation makes certain production factors, goods, or services more expensive in comparison to others, which leads taxpayers to substitute the consumption of those factors, goods, or services with others. Through changes in relative prices, the tax system creates distortions in economic decisions, whereby taxes create excess burden or a welfare loss that exceeds the value of the taxes collected. Taxation causes market distortions by creating a tax wedge between production costs and the prices of goods and services, thereby disrupting the fundamental principle of economic efficiency that the marginal benefit of a good or service must be equal to the marginal cost of its production. In this way, taxes create welfare losses both for consumers and for producers (Rosen and Gayer, 2009; Burda and Wyplosz, 2012).

The second channel through which tax policy affects economic growth is a consequence of changes in the relative prices of production factors, final products, services, and other activities of taxpayers, and involves distortions in the decisions of economic agents caused by the introduction of taxes. The consequences of these distortions are manifested through the income effect of taxes (lower consumption of goods and services) and the substitution effect, which represents the extent to which the consumption of the taxed good or service decreases due to an increase in its relative price. In the process of transferring part of the income of taxpayers to the state, the tax system causes changes in the real disposable income of taxpayers, which leads to their reaction

to the reduced income by adjusting decisions related to work, education, training, saving, investment, risk-taking, and entrepreneurship, as well as decisions related to consumption. By altering the economic decisions of taxpayers, the tax system creates additional excess burden, that is, a new welfare loss based on the excess burden caused by distortions in choices induced by tax policy (Rosen and Gayer, 2009; Stiglitz, 2013).

The third channel through which tax policy affects economic growth arises from the efficiency with which the state uses collected tax revenues, or as a consequence of the achieved level of economic, social, and political development of the country. (Marjanović, 2025) When defining public policies, the state seeks to achieve a broad range of social objectives, and is not primarily motivated by the economic principles of resource allocation. The state reallocates national resources in a manner that is not inherent to economic agents, which creates a gap in the efficiency of using resources collected through the tax system by the state compared to the efficiency with which resources are used by the private sector. The allocation of funds by the state typically yields a lower rate of return compared to the rate of return that would be achieved by the private sector. By directing a significant portion of limited societal resources toward unproductive purposes (economic efficiency is not the primary goal of the state), the state creates distortions that can be considered opportunity costs of resource reallocation, that is, additional excess burden representing a pure loss in terms of the efficiency of the national economy (loss of social welfare). This excess burden is directly dependent on the efficiency of the state.

It should be noted that economic efficiency and the concept of economic growth based on it are not the most important goals of the state, and thus the issue of the impact of tax policy on long-term economic growth is often a matter of choosing between economic efficiency and the level of social welfare. The modern state aims to maximize the level of social welfare through the definition of appropriate public policies, while economic growth is only one component of the complex social welfare function. Certainly, the tax system is one of the most important determinants of the level of social welfare, considering that it provides social benefits that cannot be measured through basic economic calculations, which is how taxpayers usually perceive reality. By providing public goods and services, the state ensures the necessary conditions for the functioning of modern society. Therefore, the existence of economic efficiency costs of the tax system, manifested as excess burden or welfare loss, needs to be thoroughly examined in the effort to create a tax system that minimizes such costs. The tax system generates losses that can be rationalized through the process of improving the existing tax system. In order to produce public goods

and services, the state must impose taxes and deal with distortions. However, this should be done in the least inefficient way possible (Burda and Wyplosz, 2012).

A significant number of studies in the economic literature investigate the impact of tax policy on long-term economic growth. Arnold (2008) analyzes the impact of tax structure and the level of tax burden on economic growth using a sample of 21 OECD member countries over the period 1971 to 2004, and concludes that the total tax burden has a negative and statistically significant impact on long-term growth. Xing (2011) examines the impact of tax structure and the level of tax burden on long-term economic growth in a sample of 17 OECD countries from 1970 to 2004, and finds that the overall tax burden has a negative and statistically significant effect on long-term growth. Acosta-Ormachea and Yoo (2012) observe the impact of tax policy on long-term economic growth in the context of the country's level of development. Their sample includes 69 countries from 1970 to 2009, with data for 21 highly developed countries, 23 middle-income countries, and 25 low-income countries. For the entire sample, the tax burden exerts a negative and statistically significant effect. This study highlights one of the most important dimensions of the impact of tax policy on economic growth, which is the level of development of the country, from which its efficiency in designing public policies and managing limited national resources arises. McNabb and Le May-Boucher (2014) analyze the impact of tax policy on long-term economic growth using a sample of 110 countries from 1980 to 2010 (41 developed countries, 36 middle-income countries, and 33 low-income countries). Noting the much lower share of total tax revenues in GDP in low-income countries due to the large informal economy, tax evasion, and low tax morale, the authors emphasize the importance of efficient, strong, and developed institutions as a basic precondition for sustainable economic growth. The results show that in both developed and middle-income countries, the total tax burden has a positive but statistically insignificant effect on long-term growth, while in low-income countries, the impact is negative and also statistically insignificant. Esen and Aydin (2019) explore the optimal level of tax burden using a sample of 11 transitional countries from Southeast Europe and the Baltics, based on data from 1995 to 2014, and confirm the existence of a nonlinear effect of tax burden on long-term growth. The optimal level of tax revenues that maximizes growth is estimated at 18 percent of GDP for the entire sample, 18.5 percent for developing countries in the sample, and 23 percent for developed countries. Tax revenues exceeding the estimated threshold negatively affect long-term economic growth, while revenues below the defined threshold have a positive impact on growth. (McNabb & Le May-Boucher, 2014; Anufrijev et al., 2025)

There is also a considerable number of empirical studies that reject the existence of a long-term impact of tax policy on economic growth. Padda and Akram (2009) analyze the impact of tax policy on economic growth in a sample of seven transitional Asian countries from 1971 to 2007, concluding that tax policy has a temporary, transitional effect on long-term growth. Bakija and Narasimhan (2015) examine the effects of the level and structure of tax revenues on long-term economic growth in a sample of 79 countries from 1980 to 2010 and conclude that tax policy does not affect the level or growth rate of gross domestic product. Gbato (2017) analyzes the impact of taxation on economic growth in 32 Sub-Saharan African countries from 1980 to 2010, and concludes that the level of tax burden and the structure of tax revenues have no impact on long-term growth. The author points to the weak administrative capacity of the region and poorly designed tax systems in which most of the tax burden falls on the poorest segments of the population, along with discrimination against the poor in income distribution. Alinaghi and Reed (2018) examine the impact of tax policy and government expenditures on economic growth in a sample of 34 OECD countries from 1961 to 2010, and conclude that without taking into account other components of fiscal policy, tax policy does not have a significant long-term effect on economic growth.

Tax policy cannot be observed in isolation from other factors of economic, social, and political reality, nor from other components of the social welfare function (Lalić & Trifunović, 2026). Tax policy is only one segment of social reality, and its effects depend on the nature of societal relations, cultural patterns, the quality of the institutional framework, the political environment, the efficiency of the state, and other characteristics related to the level of economic, social and political development achieved. (Trifunović et al., 2024).

Methodology

The assessment of the long-term relationship between the level of tax burden (tax revenue level) and the level of economic activity is conducted using annual data from balanced panel models for a group of 16 developed and a group of 15 transitional European countries for the period from 1995 to 2019, through the estimation of coefficients with regressors in a dynamic panel model using the Difference Generalized Method of Moments.

The aim is to identify the strength and nature of the long-term relationship between the level of tax burden and the level of gross domestic product as an indicator of the level of economic activity or the country's economic development. Based on the fact that the characteristics and effects of tax policy on economic activity depend on the achieved level of economic, social and

political development of the country, the goal is also a comparative analysis of the impact of tax policy on the level of economic activity in two groups of countries, which differ in their level of development (economic efficiency)..

The dynamic form of the panel model is obtained by extending the static form of the model with the lag of the dependent variable, $y_{i,t-1}$, which becomes a new variable in the set of explanatory variables of the model. The dynamic form of the panel model can thus be presented as follows:

$$y_{it} = \psi y_{i,t-1} + \beta_{1it} + \sum_{k=2}^K \beta_{kit} X_{kit} + u_{it} \quad (1)$$

In the basic specification of the dynamic panel model, y_{it} represents the value of the dependent variable for the i -th observation unit in time period t ; ψ is a scalar that indicates the importance of the adjustment dynamics of the dependent variable over time (importance of history, new informations), with $|\psi| < 1$; $y_{i,t-1}$ represents the first lag of the dependent variable; β_{1it} is the intercept term that varies across both dimensions and captures differences between observation units and over time (heterogeneity of the model); κ denotes the number of explanatory variables (regressors), while X_{kit} represents the value of the κ -th explanatory variable for the i -th observation unit in time period t ; β_{kit} are the unknown regression parameters (slope coefficients) to be estimated, which show the impact of a one-unit change in the given regressor on the movement of the dependent variable, and which vary across observation units and over time; u_{it} is the random error term with zero mean and constant variance, capturing the influence of unobserved factors that change over time and affect the dependent variable (Baltagi, 2008; Jovičić and Dragutinović Mitrović, 2011; Wooldridge, 2012).

By introducing the lag of the dependent variable into the set of explanatory variables, we introduce dynamics into the model by providing new information on the history of the dependent variable, which carries information on the impact of all variables that have historically shaped the dynamics of the dependent variable. This ensures more accurate parameter estimates compared to those obtained using methods designed for estimating the static form of the panel model (Greene, 2002; Roodman, 2009). It is a fact that the current level of gross domestic product is not determined solely by the regressors included in the model, but also by growth achieved in the previous period through the influence of factors not included in the model. Therefore, including the lag of the dependent variable as an additional regressor is especially important for obtaining valid estimates of the equation modeling the relationship between the

level of tax burden and the level of gross domestic product as an indicator of economic activity.

An additional reason for estimating the dynamic form of the panel model lies in the fact that, when macroeconomic variables are the subject of the panel model, there is a pronounced simultaneity between economic growth (level of economic activity) and the model regressors, which is the main source of endogeneity in panel models (Bleaney, Gemmell, and Kneller, 2001). In the presence of endogenous regressors, which is inherent to modern macroeconomic conditions, the coefficient estimates obtained using the ordinary least squares method are biased and inconsistent. Therefore, it is necessary to control for the negative impact of endogenous regressors, which is enabled by the dynamic form of the panel model (Bleaney, Gemmell, and Kneller, 2001; Arnold, Bassanini, and Scarpetta, 2007; Elitzka, 2007; Dackehag and Hansson, 2012).

The dynamic panel model used to estimate the long-term relationship between the level of tax burden and the level of economic activity in developed and transitional European countries, using the Difference Generalized Method of Moments, has the following form:

$$\begin{aligned} \text{lngdppc}_{i,t} = \psi \text{lngdppc}_{i,t-1} + \alpha_0 \text{ttrev}_{i,t} + \beta_2 \text{invest}_{i,t} + \beta_3 \text{hc}_{i,t} + \beta_4 \text{ur}_{i,t} + \beta_5 \text{ggc}_{i,t} + \\ \beta_6 \text{socf}_{i,t} + u_{i,t} \end{aligned} \quad (2)$$

where $\text{lngdppc}_{i,t}$ represents *gross domestic product per capita* as a measure of economic activity (economic development), expressed in US dollars at constant 2010 prices, the dependent variable (source: World Bank, World Development Index); $\text{lngdppc}_{i,t-1}$ is the first lag of the dependent variable; ψ is a scalar indicating the importance of the adjustment dynamics of the dependent variable over time; $\text{ttrev}_{i,t}$ represents the *level of tax burden* as the variable of interest, i.e. the amount of total tax revenues including mandatory social security contributions, expressed as a percentage of gross domestic product (source: OECD Stat, EU Stat, IMF Stat, ICTD/Unu-Wider); α_0 represents the coefficient that captures the impact of the variable of interest on the dependent variable. The set of control variables, X_{kit} , is defined in accordance with the main assumptions of endogenous growth theory, aiming to include the fundamental factors of economic growth, i.e. the impact of investment in physical and human capital, economic cycles, government spending, and the achieved level of economic, social and political development of the country. The control variables include: *investment in physical capital* (infrastructure, factories, machinery and equipment) as a percentage of GDP, $\text{invest}_{i,t}$ (source: World Bank, WDI);

investment in human capital expressed as an index based on years of schooling and the earnings increase from each additional year of education, $hc_{i,t}$ (source: Penn World Table, Version 10.0); *unemployment rate* (total unemployment rate) as a percentage of total labor force, representing the impact of economic cycles and crises on national economy. For developed countries, this is proxied by the unemployment rate of the United States, and for transitional countries by the unemployment rate of the Eurozone of 19 developed countries, $ur_{i,t}$ (source: OECD Stat); *government current consumption*, defined as final consumption expenditure of the government for the purchase of goods and services, excluding investment and transfers, expressed as a percentage of GDP, $ggc_{i,t}$ (source: World Bank, WDI); *social factors* as an indicator of the achieved level of social and political development of the country (indirectly, also of the level of economic development), expressed as the average value of three indicators: rule of law, control of corruption, and political stability, denoted $socf$, ranging from 0 to 5 (higher value indicates higher development level) (source: World Bank, World Governance Indicators). This variable encompasses the social and political factors of economic growth.

Table 1. Overview of variables and data sources

Label	Variable name	Variable description	Data source
lngdppc	level of economic activity	Gross domestic product per capita expressed in USD, constant 2010 prices.	World Bank/WDI
ttrev	level of tax burden	Total collected tax revenues, including mandatory social security contributions, as % of GDP.	OECD Stat, EU Stat, IMF Stat, ICTD/Unu-wider
invest	investment in physical capital	Investment in physical capital at the level of the national economy, as % of GDP.	World Bank/WDI
hc	investment in human capital	Human capital index – investment in human capital expressed through earnings from each additional year of education.	World Penn Table 10.0
ur	business cycles and crises	Unemployment rate in the United States or in the Eurozone, % of total labor force.	OECD Stat
ggc	government current consumption	Final government consumption for the purchase of goods and services, % of GDP.	World Bank/WDI
socf	economic, social and political development – level of development achieved	Average value of indicators: rule of law, control of corruption, and political stability (0–5 scale)	World Bank/WGI

All model variables are expressed in annual data for the period from 1995 to 2019, covering two groups of countries defined by their level of economic, social and political development, as well as by the conditions under which they built and developed society and the national economy. Considering the significant differences in GDP per capita among the panel members, the dependent variable *gdppc* is expressed in natural logarithm in both country groups.

The group of developed European countries includes 16 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom and Portugal.

The group of transitional European countries includes 15 countries: Bulgaria, Estonia, Croatia, Hungary, Lithuania, Latvia, Romania, Russian Federation, Poland, Slovakia, Slovenia, Turkey, Czech Republic, Moldova and Ukraine.

Economic theory is based on the position that the tax burden has a positive impact on the level of economic activity in the long term, up to a certain level of total tax burden, regardless of the achieved level of development of the country, bearing in mind that by financing basic functions, the state creates conditions for the functioning of the national economy. So, a certain level of tax burden is necessary for the functioning of society, but in addition to the question of the structure of tax revenues, the essential question of the impact of tax policy on long-term economic growth is the level of tax burden that will not endanger long-term economic growth, that is, what is the level of tax burden at which the positive impact of taxes on the level of economic activity stops?

Considering the fact that countries with lower levels of economic, social and political development have a less efficient state, the assumption is that the positive impact of the level of tax burden on the level of economic activity stops being effective at a lower level of tax burden in countries with a lower level of development or economic efficiency. In order to confirm the validity of this theoretical assumption, it is necessary to econometrically determine the level of tax burden at which the positive effect of the total tax burden on the level of economic activity stops being effective in the group of developed and the group of transitional European countries, that is, the threshold of total tax burden (threshold effect).

The econometric method of determining the threshold of the impact of tax burden on the level of economic activity aims to establish the nature of the long-term relationship between the total tax burden and the level of gross domestic product, that is, to answer the question of whether there is a statistically

significant level of tax burden at which the total tax burden changes the direction of its impact on gross domestic product (threshold of impact), and whether that level of tax burden differs for countries at different levels of economic, social and political development.

In order to determine the existence, level, and significance of the threshold of the impact of tax burden on the level of economic activity, a dynamic panel model with a threshold effect will be formulated in the following form (Hansen, 1999; Kremer, Bick, Nautz, 2009; Seo, Shin, 2016):

$$\ln g d p p c_{i,t} = \beta_1 t t r e v_{i,t} I(t t r e v_{i,t} \leq \gamma) + \delta_1 I(t t r e v_{i,t} \leq \gamma) + \beta_2 t t r e v_{i,t} I(t t r e v_{i,t} > \gamma) + \varphi Z_{i,t} + u_{i,t} \quad (3)$$

The level of tax burden, $t t r e v_{i,t}$, is both the threshold variable and the regressor of interest in the dynamic panel model: β_1 and β_2 presents the marginal impact effect of tax burden on GDP per capita level below and above the estimated threshold value γ . In practice, β_1 and β_2 represent coefficients for two different regimes of their interdependence. Variable $Z_{i,t}$ is a vector of exogenous and endogenous regressors (control variables), including the first lag of the dependent variable, $\ln g d p p c_{i,t-1}$.

The assessment of the threshold effect of the level of tax burden on the level of economic activity will be conducted using the Seo-Shin test of dynamic threshold effect, which is designed for application to dynamic panel models characterized by threshold effects and endogeneity of regressors (Seo, Shin, 2016), whereby the hypotheses are defined as follows:

H₀: $\beta_1 = \beta_2$, there is no threshold effect, γ is not identified – the effect of the level of tax burden on the level of gross domestic product is represented by a linear function;

H₁: $\beta_1 \neq \beta_2$, there is a threshold effect, γ is identified and statistically significant – the effect of the level of tax burden on the level of gross domestic product is represented by a nonlinear function.

Research results

The results of estimating the dynamic form of the panel model used to simulate the impact of the level of tax burden on the level of economic activity in the long term, along with additional test statistics for verifying the assumptions of the dynamic panel model, are presented in Table 2.

Table 2. Estimates of the dynamic panel model, dependent variable $\ln gdp_{pc}$

Variables	DEVELOPED COUNTRIES	TRANSITION COUNTRIES
	GMM difference	GMM difference
$\ln gdp_{pc_{i,t-1}}$	0.192** (0.083)	0.809*** (0.023)
ttrev	-0.028*** (0.002)	-0.010*** (0.003)
invest	0.001 (0.001)	0.006*** (0.001)
hc	0.009** (0.004)	0.003* (0.002)
ur	-0.010** (0.004)	-0.013*** (0.001)
ggc	-0.014*** (0.004)	-0.007*** (0.002)
socf	0.071*** (0.022)	0.039*** (0.011)
<i>Arellano-Bond AR(1) test, value / p-value</i>	-3.69/0.000	-2.57/0.010
<i>Arellano-Bond AR(2) test, value / p-value</i>	-0.93/0.352	0.31/0.760
<i>Hansen test, value / p-value</i>	10.98/0.203	12.73/0.121
<i>Number of instruments</i>	15	15
<i>Number of panel members</i>	16	15

Note: Standard errors are shown in parentheses; ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively.

The level of tax burden has a negative and statistically significant effect on the level of economic activity in the long term in both groups of observed European countries. An increase in the tax burden, expressed as a percentage of gross domestic product, leads to a reduction in the level of economic activity in the long term (economic development), regardless of the country's achieved level of economic, social and political development.

The negative effect of the level of tax burden on the level of economic activity is stronger in the group of developed European countries, where an increase of 1% in the tax burden leads to a 2.8% decrease in economic activity, while in the group of transitional countries, the same increase leads to a 1% decrease. The dependent variable in the group of developed countries, as well as the variable of interest (tax burden), are stationary in the first difference and were included in the model as such, while in the transitional group, both the dependent variable and the variable of interest are stationary at level and were included accordingly. The values of the estimated coefficients for tax burden were obtained considering that the dependent variable is expressed in natural logarithm, unlike

the regressors. Therefore, the estimated impact of tax burden on the movement of GDP per capita is calculated as follows:

$$(e^{\text{estimated coefficient}} - 1) \times 100 \quad (4)$$

The control variables in the model have statistically significant effects in the expected theoretical direction. Investment in physical capital is not statistically significant in the group of developed European countries, which is expected due to the convergence effect and the fact that developed countries base their economic growth on the quality of human capital, investment in human capital, total factor productivity, and the quality of the social environment, with continuous improvement in indicators of social development, following decades of investment in physical capital. Investment in human capital has a positive and statistically significant effect on the level of economic activity in the long term in both groups of countries, while economic cycles, crises, and external shocks reflected through the unemployment rate, as well as government current consumption, have a negative and statistically significant effect regardless of the level of economic, social and political development of the country. The achieved level of social development has a positive and statistically significant effect in both groups of countries.

The realized values of test statistics and the corresponding p-values used to assess the quality of the defined dynamic panel model show that all assumptions of the model are satisfied. These include the absence of autocorrelation in the error term at the second lag, the adequacy of the selected set of instrumental variables for addressing endogeneity, and the acceptable number of instruments relative to the number of panel members, which is a necessary condition for obtaining valid and consistent estimates in the dynamic panel model.

To test the robustness of the model's parameter estimates, its specification and the selected determinants, we re-estimated models using modified samples for both groups of countries, in accordance with available data. The sample for developed European countries was extended to cover the period from 1975 to 2019, since a broader database exists for this group. The sample for transitional countries was reduced by three countries, with the observed time period unchanged. The countries excluded from the transitional group are the Czech Republic, Slovakia, and Slovenia, for the following reasons:

- Although these countries underwent a transition process during the observed period, based on GDP levels they belong to the group of developed European countries;

- According to their level of economic, social and political development, these countries belong to the group of developed European countries, especially in terms of institutional development.

The results of the robustness check of the dynamic panel model estimates are presented in Table 3.

Table 3. Robustness check of the dynamic panel model, dependent variable: lngdppc

Variables	DEVELOPED COUNTRIES		TRANSITION COUNTRIES	
	GMM difference		GMM difference	
	1975-2019	1995-2019	12 countries	15 countries
lngdppc _{i,t-1}	0.291*** (0.053)	0.192** (0.083)	0.859*** (0.043)	0.809*** (0.023)
ttrev	-0.011*** (0.002)	-0.028*** (0.002)	-0.004** (0.001)	-0.010*** (0.003)
invest	0.013*** (0.003)	0.001 (0.001)	0.012*** (0.001)	0.006*** (0.001)
hc	0.000 (0.000)	0.009** (0.004)	0.003 (0.002)	0.003* (0.002)
ur	-0.005* (0.002)	-0.010** (0.004)	-0.008*** (0.002)	-0.013*** (0.001)
ggc	-0.022*** (0.007)	-0.014*** (0.004)	-0.010*** (0.002)	-0.007*** (0.002)
socf	0.056*** (0.006)	0.071*** (0.022)	0.031** (0.014)	0.039*** (0.011)
<i>Arellano-Bond AR(1) test, value / p-value</i>	-2.21/0.027	-3.69/0.000	-2.95/0.003	-2.57/0.010
<i>Arellano-Bond AR(2) test, value / p-value</i>	-1.28/0.200	-0.93/0.352	-1.33/0.183	0.31/0.760
<i>Hansen test, value / p-value</i>	9.39/0.311	10.98/0.203	8.37/0.123	12.73/0.121
<i>Number of instruments</i>	15	15	12	15
<i>Number of panel members</i>	16	16	12	15

Note: Standard errors are given in parentheses; ***, **, and * denote significance levels of 1%, 5%, and 10%, respectively.

After testing the robustness of the parameter estimates in the dynamic panel model, the conclusion remains unchanged: an increase in the level of tax burden leads to a decrease in the level of economic activity in the long term, regardless of the achieved level of economic, social and political development. The statistical significance of the estimated coefficients for the regressors in the dynamic panel model, as well as the direction of causality, remains almost identical even after changing the sample in both groups of countries, indicating a high level of robustness of the defined model and the selected regressors for long-term economic activity dynamics.

To assess the nature of the effect of the level of tax burden on the dynamics of economic activity in the long term (whether the relationship is linear or nonlinear), considering that economic theory holds that tax burden has a positive effect on economic activity up to a certain level of total tax burden regardless of a country's level of development—because the financing of basic state functions creates the conditions for the functioning of the national economy—a dynamic panel model with a threshold effect was also estimated.

The result of applying the Seo-Shin test for the dynamic threshold effect on the panel model defined by Equation (3) is shown in Table 4.

Table 4. Threshold effect of tax burden level on GDP, threshold variable $trev$

test	DEVELOPED COUNTRIES		TRANSITION COUNTRIES	
	γ value	p - value	γ value	p - value
<i>Seo-Shin test of dynamic threshold effect</i>	31.54%	0.000	27.60%	0.000

The existence of a statistically significant threshold effect of the level of tax burden on the level of economic activity indicates the nonlinear nature of the long-term relationship between tax burden and economic activity. Tax burden has a positive effect on the level of economic activity in the long term up to a certain level of burden, regardless of the country's development level. However, the positive effect of tax burden on economic activity ceases to take effect at a lower tax burden level in countries with lower development.

The threshold value for the level of tax burden in the group of developed European countries is 31.54% of gross domestic product, while in the group of transitional European countries it is 27.60%. The average tax burden in both groups of countries is significantly higher than the estimated threshold value (37.48% for the group of developed countries and 31.43% for the group of transitional countries). Therefore, the impact of tax burden on the level of economic activity in the long term is negative and statistically significant in both groups of countries.

Conclusion

The level of tax burden has a negative, statistically significant impact on the level of economic activity, which is represented by the level of gross domestic product per capita. An increase in the level of tax burden leads to a decrease in the level of economic activity in the long run, regardless of the achieved level of economic, social and political development of the country. The negative impact of the level of tax burden on the level of economic activity is stronger in developed European countries, where a 1% increase in the level of tax burden

leads to a decrease in gross domestic product per capita by 2.8%, while a 1% increase in the level of tax burden in the group of transitional European countries leads to a decrease in the level of economic activity by 1%. The long-term relationship between the level of tax burden and the level of economic activity represents a nonlinear function of concave form, which means that the level of tax burden has a positive impact on the level of economic activity in the long run up to a certain level of tax burden, regardless of the achieved level of development of the country.

The positive impact of the level of tax burden on the level of economic activity in the long run ceases to be effective at a lower level of tax burden in countries at a lower level of development, as a result of a less efficient state, weak institutional framework, low level of tax morale and quality of tax administration, and a cultural, historical, political, and value framework that is tolerant of tax evasion. The threshold level of tax burden for the group of developed European countries is 31.54% of gross domestic product, while for the group of transitional European countries it is 27.60% of gross domestic product. The average tax burden for both groups of countries in the observed period is significantly higher than the established threshold and amounts to 37.48% for the group of developed European countries and 31.43% for the group of transitional European countries, so the impact of the level of tax burden on the level of economic activity in the long run is negative and statistically significant in both groups of observed European countries.

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UTICAJ NIVOVA PORESKOG OPTEREĆENJA NA DUGOROČNU EKONOMSKU AKTIVNOST

Apstrakt

Ovaj rad istražuje komparativne dugoročne efekte nivoa poreskog opterećenja na ekonomsku aktivnost u razvijenim i tranzicionim evropskim zemljama. Metodološki pristup zasniva se na teoriji endogenog rasta, koja uključuje ekonomske, društvene i političke varijable radi simuliranja postojanja dugoročne veze između poreske politike i ekonomskog rasta, sa ciljem identifikovanja preporuka poreske politike koje podržavaju održivi rast.

Procena dugoročne veze između nivoa poreskog opterećenja i ekonomske aktivnosti sprovedena je korišćenjem godišnjih podataka iz balansiranih panel modela koji obuhvataju 16 razvijenih i 15 tranzicionih evropskih zemalja u periodu od 1995. do 2019. godine. U analizi je primenjen dinamički panel model procenjen metodom diferencijalnog generalizovanog metoda momenata (Difference Generalized Method of Moments – GMM).

Empirijski nalazi ukazuju da je uticaj poreskog opterećenja na dugoročnu ekonomsku aktivnost nelinearan i statistički značajan u obe grupe zemalja. Rezultati sugerišu da održivi ekonomski rast zahteva smanjenje nivoa poreskog opterećenja.

Ključne reči: *poresko opterećenje, ekonomski rast, panel model.*

JEL: *H21, O43, C23.*

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EVOLUTION OF FINANCIAL REPORTING LEGAL REGULATIONS IN THE EUROPEAN UNION AND IMPLICATIONS FOR SERBIA

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Review Article

Abstract

Financial reporting is a key mechanism for ensuring transparency, accountability, and trust in the capital market and the broader economic system. The development of the European Union's legal framework reflects a long-term process of harmonisation aimed at improving the comparability and reliability of financial information among Member States. Foundational directives, later consolidated through Directive 2013/34/EU, established a modern framework for financial and non-financial reporting, further enhanced by Directive 2014/95/EU and the Corporate Sustainability Reporting Directive (CSRD). As an EU candidate country, the Republic of Serbia has made significant progress in aligning its legislation with European standards, particularly through the 2019 Law on Accounting. However, challenges remain in the full implementation of International Financial Reporting Standards (IFRS) and in strengthening institutional oversight and quality control. This paper analyzes the evolution of EU financial reporting regulations, evaluates the level of harmonisation in Serbia, and identifies key challenges and opportunities for further improvement.

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Keywords: *financial reporting, legal regulations, harmonization, international financial reporting standards (IFRS).*

JEL: *M41, K22, G38*

Introduction

The subject of the research in this paper is a detailed analysis of the development, basic characteristics and implications of the legal regulation of financial reporting within the European Union, with a special emphasis on its impact and significance for the Republic of Serbia. The focus of interest is the process of evolution of the normative framework that determines the manner, scope and quality of financial reporting, as well as the course of harmonization of domestic regulations with the *acquis communautaire*.

The aim of the research is to identify the main phases and directions of development of EU legal regulations in the field of financial reporting, to analyze the degree of compliance of Serbian legislation with European standards, as well as to point out contemporary challenges, limitations and opportunities for improving the regulatory framework in the Republic of Serbia. In addition, the aim is to demonstrate the importance of harmonizing accounting regulations in the process of accession to the European Union, as this increases the transparency of financial reporting, which is a basic prerequisite for creating a stable business environment and strengthening investor confidence (Gojkov, 2024).

Financial reporting plays a key role as an instrument of corporate transparency and accountability, and its legal regulations reflect the level of development of the institutional and economic system of each country. In the modern conditions of globalization and intensive integration of capital markets, the harmonization of accounting and reporting standards is becoming a necessity in order to ensure the comparability and reliability of financial information. The Republic of Serbia, as a country aspiring to membership in the European Union, is faced with the obligation of constantly harmonizing its laws with European directives and regulations governing the field of financial reporting. This topic is particularly important because the European Union has been undergoing dynamic changes in the regulatory framework in recent years - it is moving from traditional financial reporting to integrated and non-financial reporting, which is clearly seen through the adoption of the Sustainability Reporting Directive (SRRD). Therefore, it is of particular importance to consider how these European changes are reflected in the domestic financial reporting system and

to what extent Serbia manages to implement requirements that guarantee transparency, accountability and compliance with international standards.

Starting from the determined subject and set research objectives, the following research hypotheses were defined:

- H1: The legal framework for financial reporting in the European Union has gone through several development stages, starting from the basic balance sheet directives to the formation of a comprehensive system that also includes non-financial reporting.
- H2: The Republic of Serbia has largely harmonized its legislation with the EU legal framework, but there are still certain shortcomings in terms of full implementation of regulations and institutional support.
- H3: The harmonization process contributes to improving the quality of financial reports, increasing their transparency and strengthening investor confidence, which has a positive impact on economic development and the European integration process.

The research used combined methodological approaches, based on the following methods:

- Analysis of legal acts - includes a systematic study of relevant European directives, regulations and national laws governing financial reporting.
- Comparative analysis - involves a comparison of legislative solutions of the EU and the Republic of Serbia in order to determine the degree of harmonization and identify existing differences.
- Normative approach - is used to examine legal norms in their institutional and systemic context.
- Analysis of EU and Serbian documents - includes the study of relevant sources, such as documents of the European Commission, EFRAG, IASB, as well as national regulations, reports and expert papers.

The methodological framework set out in this way enables a comprehensive and integrated approach to research, which includes legal, institutional and practical aspects of the development of financial reporting, with the aim of formulating conclusions that have both theoretical significance and practical application.

Theoretical-methodological framework of financial reporting

Financial reporting is an organized and systematic process of collecting, processing, presenting and interpreting financial information about the business

activities of an entity over a period of time. Its primary purpose is to provide accurate, reliable, relevant and comparable information to users inside and outside the organization, so that they can make rational and informed economic decisions based on this data (Venturelli et al., 2019). In a narrow sense, financial reporting refers to the preparation and presentation of financial statements in accordance with internationally accepted accounting standards, such as IAS and IFRS. In a broader sense, however, this term also includes additional reports that go beyond traditional financial indicators, including reports on sustainability, corporate governance and identified risks in the business (Tarquinio & Posadas, 2020).

The importance of financial reporting is reflected in its role in ensuring the transparency of the capital market, in strengthening the reliability of investment decisions and in increasing management's accountability to owners, creditors and the general public (Quick & Inwinkl, 2020). High-quality and properly implemented financial reporting contributes to preserving the stability of the entire financial system, more efficient capital allocation and better protection of the interests of all stakeholders. Within the corporate sector, financial reports have a key communication function between management and external users – investors, banks, regulatory bodies and shareholders. The balance sheet, income statement, cash flow statement and statement of changes in equity together provide a comprehensive insight into the financial position, profitability and liquidity of a business entity (Golubović & Janković, 2023). In this way, financial reporting enables the assessment of business performance and supports the making of strategic decisions on investment, financing structure and profit distribution. When it comes to the public sector, financial reporting has a more pronounced social dimension. Its main function is to ensure transparency in the work of public institutions and accountability in the spending of budget funds (Guthrie & La Torre, 2020). Within the budget process, financial reports play a central role in planning, controlling and evaluating public spending. In modern management models known as New Public Management, financial reporting also becomes an instrument for measuring the efficiency and success of public services and institutions (Vukša & Milojević, 2024). Although the basic goals of both sectors – transparency and accountability – are essentially the same, differences exist in the regulatory frameworks and applicable standards. The private, or corporate, sector is based on International Financial Reporting Standards (IFRS), while the public sector relies on International Public Sector Accounting Standards (IPSAS). Both sets of standards strive to achieve harmonization and alignment with the principles and requirements of the European Union, which is of utmost importance in the process of European integration.

The quality of financial reporting is based on three basic principles: transparency, accuracy and comparability. Transparency means that the information from the report is fully accessible, clear and understandable to all interested users. In this way, the information asymmetry between management and investors is reduced, market confidence is increased and the functioning of financial markets is improved (Waymire, 2009). The principle of accuracy, or reliability, refers to the need for financial statements to realistically, truthfully and objectively present the financial position and performance of an entity. This principle implies the consistent application of accounting policies, standards and methods that enable the data presented to reflect actual business events (Radebaugh et al., 2006). The third key principle, comparability, allows users to analyze changes in the financial results of an entity over time, as well as to make comparisons between different entities. This characteristic is particularly important for international investors and regulatory bodies, which further justifies the European Union's aspiration to create a single financial reporting framework based on IFRS standards (Neševski & Bojičić, 2024). The application of these principles not only strengthens the integrity of the financial system but also encourages greater accountability of management structures, improves decision-making processes and contributes to more efficient functioning of economic entities at all levels.

Research into the legal framework of financial reporting involves the application of multiple methodological approaches – normative, comparative and analytical.

The normative approach is used to study and interpret legal sources, including directives, regulations, laws and accounting standards, with the aim of determining their legal nature, hierarchical relationship and mutual compliance.

The comparative approach allows for a comparison of legal solutions valid within the European Union and the Republic of Serbia, as well as the identification of similarities, differences and potential problems in the transfer of the EU *acquis communautaire*.

The analytical approach includes a quantitative and qualitative assessment of the effects that the implementation of legal regulations has on the quality of financial reporting, the investment climate and institutional capacities (Rykaczewski et al., 2022).

In empirical research in this area, case studies are often used, which analyze the implementation of IFRS standards in individual EU member states, surveys among professional accountants and auditors, as well as statistical analyses of changes in the quality of published financial statements. Combining these

methodological approaches allows for a comprehensive overview of the legal, economic and institutional aspects of the financial reporting system.

Historical development and evolution of financial reporting legislation in the European Union

The development of the financial reporting regulatory framework in the European Union (EU) has been a long and complex process that has progressed through several development phases – from individual national accounting regulations to a single European framework based on international financial reporting standards. The essence of this process was to create a system that would ensure greater transparency, comparability and reliability of financial data within the EU single market, thereby contributing to the efficiency of capital markets, investor security and improving economic confidence.

Early legislative developments – Fourth and Seventh EU Directives on balance sheets and consolidation

The beginning of the harmonisation of accounting regulations within the then European Economic Community dates back to the 1970s, when the European Commission recognised that different national accounting systems needed to be harmonised in order to facilitate economic integration. As a result of these initiatives, two key directives were adopted – the Fourth Directive (78/660/EEC) and the Seventh Directive (83/349/EEC). The Fourth Directive, adopted in 1978, concerned the preparation of annual financial statements of individual companies. It established basic rules on the content and structure of the balance sheet, the profit and loss account, as well as the principles of valuation of assets, liabilities and capital. In particular, the principles of “true and fair view” and consistency in the application of accounting methods were emphasised. This directive was of crucial importance because it introduced a single framework for the first time that enabled cross-border comparability of financial statements within the Community (Nobes & Stadler, 2023). The Seventh Directive, adopted in 1983, expanded the legal basis by introducing mandatory consolidation of financial statements for groups of related companies. It defined the concepts of control, connectivity and the methodology for preparing consolidated balance sheets. In this way, conditions were created for a more realistic presentation of the financial position and performance of corporate groups (Leuz & Wysocki, 2016). These two directives were the foundation of European accounting legislation for more than twenty years, forming a bridge between national and supranational regulations. However, the intensive globalization of the market and the rapid development of the financial

sector in the 1990s showed that the existing solutions were not sufficient, which opened the way for a new, deeper reform.

Reform and transition to international standards (IAS/IFRS)

In the late 1990s, the European Union realized that partial harmonisation through directives could not ensure a high level of transparency and comparability of financial statements. Therefore, in 2002, Regulation (EC) No. 1606/2002 was adopted, which stipulates that all companies whose shares are traded on regulated markets in the EU must apply International Financial Reporting Standards (IFRS) starting from 1 January 2005. This regulation marked a turning point as the EU moved from a partial approach based on directives to a single system of international standards issued by the International Accounting Standards Board (IASB). The aim of this step was to increase transparency, strengthen investor confidence and reduce the cost of capital. The implementation of IFRS was also a strategic commitment towards global harmonisation of accounting practices, since the same standards were already widely used internationally. In this process, the European Commission took on the role of a regulator that confirms the standards adopted by the IASB, while national bodies were responsible for their implementation within their jurisdictions.

The role of the IASB, EFRAG and the European Commission

Within the European financial reporting system, three institutions have key functions:

1. IASB (International Accounting Standards Board) – an independent global body responsible for adopting and revising IFRS standards;
2. EFRAG (European Financial Reporting Advisory Group) – an advisory body established in 2001, which prepares analyses and recommendations to the European Commission on the acceptance of standards;
3. European Commission – has the formal authority to decide on the introduction of IFRS standards into European legislation through the endorsement process. EFRAG has an important intermediary role because it assesses whether the proposed standards are in line with the EU public interest, market stability and the protection of users of financial statements (EFRAG, 2024). This ensures a balance between international harmonisation and the specific needs of the Union.

Directive 2013/34/EU on annual financial statements and its importance

In 2013, the European Union adopted Directive 2013/34/EU, which replaced the Fourth and Seventh Directives with a single document. This directive carried out a fundamental reform of accounting legislation, adapting it to modern economic trends and the requirements of users of financial information. Simplified reporting obligations were introduced for micro, small and medium-sized enterprises, which reduced administrative costs, while at the same time increasing transparency requirements for large companies. The directive also highlighted the importance of management reporting, which includes non-financial aspects and risk data (European Commission, 2024). In this way, the principle of proportionality was introduced, i.e. a more flexible reporting system that takes into account the size and importance of the company, while preserving the integrity and credibility of financial information.

Introduction of the concept of non-financial reporting (Directive 2014/95/EU)

Given the growing importance of social responsibility and sustainable business, Directive 2014/95/EU, known as the Non-Financial Reporting Directive (NFRD), was adopted in 2014. This regulation obliged large public-interest entities with more than 500 employees, including banks and listed companies, to publish information on environmental issues, social and labor relations, respect for human rights and the fight against corruption. The purpose was to expand financial reporting to include data on the social and environmental performance of businesses, thereby contributing to greater corporate responsibility and long-term sustainability. With this regulation, the European Union laid the foundations for integrated reporting that links financial and non-financial performance (Fiechter et al., 2022).

Latest trends – CSRD (Corporate Sustainability Reporting Directive) and ESRS standards

The latest step in the development of the European reporting system is Directive (EU) 2022/2464, known as the CSRD (Corporate Sustainability Reporting Directive), which entered into force in December 2022. This directive significantly expands the scope and mandatory nature of sustainability reporting, covering around 50,000 companies in the EU, including branches of foreign corporations. The CSRD introduces the application of the European Sustainability Reporting Standards (ESRS), developed by EFRAG, which cover areas such as climate change, circular economy, human rights, supply chain and corporate governance. The aim is to provide reliable, standardised and verifiable sustainability data. This directive represents a shift from voluntary to mandatory

sustainability reporting, making European financial reporting integrated, accountable and focused on long-term business sustainability and social interest.

Institutional and regulatory framework for financial reporting in the European Union

The development of financial reporting regulations in the European Union (EU) has been in line with the broader strategic objective of building a single capital market and strengthening business transparency in the economy. The key actor in this process is the European Commission (EC), which has the competence to propose legal acts and implement policies in the field of accounting and financial reporting. Through the Directorate-General for Financial Stability, Financial Services and Capital Markets Union (DG FISMA), the Commission oversees the preparation and implementation of regulations relating to accounting and auditing standards (De Simone & Olbert, 2022). In cooperation with the European Financial Reporting Advisory Group (EFRAG), the Commission is responsible for approving International Financial Reporting Standards (IFRS) for use within the EU. The process itself includes the analysis of standards adopted by the International Financial Reporting Standards Board (IASB) and their adaptation to the European legal framework through the adoption of regulations (Breuer et al., 2018). In parallel, the European Parliament has both a legislative and control function in the process of adopting regulations governing financial reporting. It, in cooperation with the Council of the European Union, participates in the adoption of directives and regulations relating to accounting practice, auditing and the publication of financial statements. The role of Parliament is particularly evident in the field of political oversight of the implementation of regulations, especially in terms of corporate responsibility and business transparency (Savić & Bonić, 2022; Milanović & Gojkov, 2024). The joint action of the Commission and Parliament enables the creation of a dynamic and adaptable regulatory system that responds to global economic changes and the demands of modern users of financial information, including the growing need for non-financial and sustainable reporting (Arafat et al., 2020). Although the EU has a centralized framework for regulating financial reporting, the implementation and control of the implementation of this regulation is entrusted to the Member States. Each Member State has a national competent body responsible for the implementation of directives and regulations in the field of accounting and auditing. These are usually ministries of finance, capital market commissions, chambers of auditors and specialized agencies that supervise financial reporting (e.g. in Germany – Bundesanzeiger Verlag and BaFin; in France – Autorité des normes comptables; in Italy –

Organismo Italiano di Contabilità). These institutions are tasked with ensuring the consistent application of approved standards and guaranteeing the reliability, accuracy and public availability of financial reports (Lanfermann et al., 2021). In addition to national regulators, European Supervisory Authorities (ESAs), and in particular the European Securities and Markets Authority (ESMA), also play an important role in the system. ESMA ensures the uniform application of IFRS across the entire European capital market, issues guidelines and conducts regular quality checks of financial reporting. In this way, a high degree of compliance, comparability and transparency is achieved between companies from different member states (Velte, 2021). This multi-layered system of oversight, involving national and supranational institutions, allows the EU to maintain a high level of reliability of financial information, which contributes to greater efficiency of capital markets and strengthening investor confidence. The application of International Financial Reporting Standards (IFRS) in the EU is based on a clearly defined approval and legal adoption process. When the IASB adopts a new standard or amendments to an existing one, EFRAG conducts a detailed technical analysis of its potential effects on users of financial statements in the EU. Based on EFRAG's opinion, the European Commission proposes a regulation approving the standard for use, which is then confirmed by the Council of the European Union (Vitolla et al., 2019). This ensures that the standards are applied only if they are in line with the public interest and if they contribute to financial stability and market efficiency. Once adopted, IFRS becomes a binding legal instrument for all companies whose securities are traded on regulated markets in the EU (Tsalis et al., 2020). Supervision of the implementation of IFRS takes place at three hierarchical levels:

1. At the internal level, supervision is carried out by the management structures of companies and independent auditors;
2. At the national level, competent state bodies check the compliance of financial statements with the prescribed standards;
3. At the European level, ESMA coordinates the supervisory activities of the member states and publishes joint reports and findings (Lu & Wang, 2021).

This multi-tiered model of supervision ensures consistent and uniform application of IFRS across the EU, reducing the risk of regulatory arbitrariness and increasing the comparability of reports. Understanding the legal nature of the EU instruments is crucial for interpreting its financial reporting system. Within the European legal order, Regulations and Directives represent the basic legislative acts, but they differ in their degree of binding force and legal effects.

- Regulations are of general nature, binding in their entirety and directly applicable in all Member States, without the need for national transposition. In the context of financial reporting, the most significant is Regulation (EC) No. 1606/2002, which stipulates the mandatory application of IFRS for public joint-stock companies in the EU. This regulation has the legal force of directly applicable law and ensures uniform application of the standards in all Member States (Dašič et al., 2023).
- Directives, on the other hand, bind Member States only with regard to the objective set, while leaving them free to independently choose the methods and means of implementation in national legislation. An example is Directive 2013/34/EU, which regulates the annual and consolidated accounts of certain companies, and which replaced the former Fourth and Seventh Directives. Member States must transpose this directive into their laws, but they have the option of partially adapting certain provisions to national specificities (Khlif, 2016).

Viewed hierarchically, regulations have greater legal force than directives because they create direct rights and obligations. However, both instruments complement each other: regulations ensure the harmonisation of capital markets, while directives allow for flexibility within national systems. In this way, the EU achieves a balance between legal uniformity and regulatory subsidiarity, which is one of the fundamental principles of European law (Savić et al., 2025a).

Financial reporting regulations in the Republic of Serbia

The development of financial reporting legislation in the Republic of Serbia can be observed through several developmental stages that reflect the process of gradual transition from a planned economy to a market economy, as well as progressive harmonization with European norms and international standards (Paspalj et al., 2024). The first important stage in this process began with the adoption of the Law on Accounting and Auditing from 2006 ("Official Gazette of the RS", No. 46/2006). This law introduced for the first time the mandatory application of International Accounting Standards (IAS) and International Financial Reporting Standards (IFRS) for large legal entities and public companies. Thus, Serbia began its official harmonization with global accounting rules and significantly moved away from the previous model of bookkeeping, which was based on the principles of a planned economy. This step represented an important milestone in the development of domestic financial reporting regulations. The second phase of development was the adoption of the Accounting Law of 2013 ("Official Gazette of the Republic of

Serbia", No. 62/2013), which introduced a clear division of legal entities by size - into micro, small, medium and large enterprises. The criteria for classification were determined based on the number of employees, the value of assets and revenues. This law more precisely regulated the application of IAS and IFRS, while IFRS for Small and Medium-sized Enterprises (IFRS for SMEs) was introduced for micro and small legal entities. In this way, the principle of proportionality and rationality in financial reporting was achieved, considering the volume of business and the importance of individual entities (Radovanović et al., 2024). The third, modern phase includes the Accounting Law of 2019 ("Official Gazette of the Republic of Serbia", No. 73/2019, 44/2021 - other laws and 123/2021), which represents an important step forward in improving the regulatory system. This regulation introduces new obligations regarding the digital submission of financial statements to the Business Registers Agency (BRA), and further strengthens the role of the Ministry of Finance in its normative, control and supervisory function. It also stipulates that official translations of international standards must be published in the "Official Gazette of the Republic of Serbia", thus ensuring greater legal certainty and transparency.

The Ministry of Finance of the Republic of Serbia plays a key role in shaping and implementing financial reporting policy. Its responsibilities include preparing and proposing laws and by-laws, harmonizing domestic regulations with the *acquis communautaire*, and issuing expert opinions regarding the application of accounting standards. The Ministry is also responsible for approving translations and publishing international standards, as well as maintaining the register of certified auditors and audit firms (Ministry of Finance, 2024).

The Chamber of Certified Auditors (KOR), as a professional and independent organization, plays a significant role in strengthening and developing the accounting and auditing profession. Its activities include conducting education and continuous professional development of auditors, issuing licenses, and supervising their work. The Chamber actively cooperates with the Ministry of Finance and international organizations on the implementation of new standards in the field of accounting and auditing (Guthrie et al., 2019).

The Business Registers Agency (BRA), established in 2005, is responsible for the collection, processing, and public publication of financial statements of all taxpayers. The electronic reporting system, introduced in 2013, has enabled a significant increase in the efficiency and transparency of financial information. BRA manages the Public Register of Financial Statements, which provides open access to data of legal entities to the public, investors, creditors, and state

authorities, thereby contributing to market discipline and strengthening trust in the financial system (BRA, 2024).

The implementation of IFRS and IAS in Serbia, which began in 2006, has been continuously improved through amendments to the law and accompanying regulations. The standards are taken directly from the original IASB (International Accounting Standards Board) documents, with mandatory publication of the translation in the "Official Gazette of the Republic of Serbia". Legal entities are classified by size, and their obligation to apply the standards depends on that classification. Large and medium-sized companies, as well as public interest entities (banks, insurance companies, public joint-stock companies), must apply IFRS in full, while smaller legal entities can use IFRS for SMEs.

The Ministry of Finance cooperates with the Chamber of Certified Auditors and the National Bank of Serbia in the process of harmonization, thus ensuring the compliance of accounting regulations with the regulations of the banking and insurance sectors (Žikić et al., 2024). This integration has contributed to greater comparability of financial statements of domestic companies with those from EU countries, which has had a positive impact on attracting foreign investment and easier access to international capital markets. The transparency of financial statements is the foundation of the functioning of a market economy and building investor confidence. In Serbia, the system of transparency and control is organized at multiple levels – normative, professional and institutional (Archel et al., 2011). On the normative front, the 2019 Accounting Law stipulates that all legal entities and entrepreneurs who maintain double-entry bookkeeping must submit annual and consolidated financial statements to the Serbian Accounting Authority within established deadlines. The Serbian Accounting Authority verifies the formal correctness of the report, while the accuracy of the content is verified through external audits and inspection supervision by the Ministry of Finance. Transparency is further enhanced by a publicly available register of financial statements, which enables easier analysis of the creditworthiness and business performance of companies. The Chamber of Certified Auditors supervises the quality of auditors' work and their reports, while the Ministry of Finance is authorized to conduct administrative supervision over the work of both the Chamber and the APR (Savić et al., 2025b). The process of harmonizing domestic legislation with the *acquis communautaire* in the field of financial reporting is an ongoing activity carried out under Chapter 6 – Company Law during the EU accession negotiations. Although Serbia has made significant progress in implementing IFRS and increasing transparency, there are still certain challenges in fully aligning with

European directives, especially in the segment of non-financial reporting (ESG) and the implementation of Directive (EU) 2022/2464 – CSRD (Corporate Sustainability Reporting Directive). The most important challenges relate to:

- strengthening the institutional capacities of the Ministry of Finance and the Chamber to monitor new regulations,
- harmonizing national criteria for company classification with Directive 2013/34/EU,
- ensuring high-quality and legally authentic translations of IFRS standards,
- improving public oversight of auditing in accordance with EU requirements.

In the coming years, further modernization of the legal framework, full implementation of European accounting standards, improvement of corporate governance and strengthening of investor confidence in the financial reporting of the Republic of Serbia are expected (Doni, 2019).

Comparative analysis – EU and Serbia

Similarities and differences in the legal framework

The legal framework for financial reporting in the European Union and the Republic of Serbia shows a high degree of convergence, although significant differences in institutional and normative structures still exist. The European Union, through the long-term process of establishing a single market, has developed a comprehensive set of rules that ensure the transparency, comparability and reliability of financial information. Key legal acts include Directive 2013/34/EU on annual and consolidated financial statements and related reports, Directive 2014/95/EU on non-financial reporting, and Regulation (EC) No. 1606/2002 on the application of International Financial Reporting Standards (IFRS) in the Member States. The Republic of Serbia, in line with the European integration process, has integrated the basic principles of these European regulations through the Accounting Law (Official Gazette of the Republic of Serbia, No. 73/2019) and the Audit Law (Official Gazette of the Republic of Serbia, No. 73/2019). These laws prescribe the application of international accounting standards issued by the International Accounting Standards Board (IASB), which is in line with EU guidelines. In addition, in Serbia, financial statements are publicly available through the Business Registers Agency (BRA), which achieves a similar level of transparency as in EU Member States. However, there are noticeable differences in terms of the

institutional independence of regulatory bodies, mechanisms for monitoring the implementation of standards and sanctioning irregularities. While the EU operates through a multi-layered supervisory system that includes the European Capital Markets Supervisory Authority (ESMA) and national regulatory commissions, in Serbia this function is primarily performed by the Ministry of Finance and the Chamber of Certified Auditors, which may affect the efficiency of regulatory implementation.

Level of compliance of domestic regulations with EU directives and regulations

Serbia's compliance with EU regulations in the field of financial reporting is assessed as high, especially in the segment of corporate reporting. The EU directive framework has been largely transposed through legislative reforms implemented between 2013 and 2019. In accordance with Directive 2013/34/EU, Serbia introduced a classification of legal entities by size (micro, small, medium and large) and prescribed the scope of financial statements in accordance with that categorization. However, full harmonisation has not yet been achieved. Differences are particularly noticeable in relation to non-financial reporting and the upcoming implementation of the Sustainability Reporting Directive (SRDD, 2022/2464/EU) and the European Sustainability Reporting Standards (ESRS), which have not yet been implemented in the Serbian legal system. Also, Serbia currently does not have a fully developed supervisory system that would be fully in line with EU practices. In the area of auditing, rules relating to auditor independence and public interest obligations are partially aligned with Directive 2006/43/EC, but limitations remain regarding the quality of control and the exchange of information between national regulators and European bodies.

Problems in the transfer of the *acquis communautaire* into the domestic system

The process of implementing the *acquis communautaire* into the domestic legal system faces numerous challenges (Contrafatto et al., 2019). The first problem concerns legal terminology and the harmonization of concepts, as certain terms from EU directives do not have direct equivalents in domestic legislation. The second challenge is the insufficient administrative and institutional capacity to implement complex regulations, especially in terms of supervision and quality control of financial reporting. The third problem relates to the lack of professional staff trained in the application of new standards, especially in the segment of sustainable and integrated reporting. Also, delays in the adoption of secondary legislation and uneven interpretation of regulations in practice are

common challenges. All of these factors slow down effective harmonization and reduce trust in financial statements, which is crucial for the development of the capital market and attracting foreign investment.

Impact of Serbia's accession negotiations (Chapter 6 – Company law and corporate governance)

Serbia's accession negotiations with the European Union, especially within Chapter 6 – Company Law, have a significant impact on the development of financial reporting regulations. This chapter covers the areas of accounting, auditing and corporate governance, which are directly related to standards of transparency and accountability in business (Savić et al., 2025b). So far, Serbia has made significant progress in regulatory alignment, but the European Commission in its progress reports regularly highlights the need to strengthen institutional enforcement and the independence of regulatory bodies. Serbia is also expected to adapt its legal framework to the new requirements imposed by the CSRD and ESRS standards in the coming period, which will require coordinated cooperation between the Ministry of Finance, the Securities and Exchange Commission, the National Bank of Serbia and business entities.

Effects of harmonization on transparency and investment climate

The harmonization of the legal framework for financial reporting with EU regulations has brought visible positive results in terms of business transparency in Serbia. The mandatory application of international accounting standards has contributed to greater comparability of financial reports, while the public availability of data through the APR increases investor confidence and facilitates the assessment of financial risk. Increased transparency also has broader macroeconomic consequences: it stimulates foreign direct investment (FDI), contributes to the development of the capital market and strengthens corporate governance. However, the full effects of harmonization can only be achieved when consistent application of regulations, continuous education of accountants and auditors, and effective supervision of reporting are achieved (Cho et al., 2015). Additionally, the introduction of mandatory non-financial and ESG (Environmental, Social, Governance) reports in the future could significantly improve corporate responsibility and position Serbia as a country that strives for modern EU business standards.

Implications and challenges for Serbia

Advantages of harmonization with European Union legislation

The process of harmonizing the legal framework of financial reporting in the Republic of Serbia with European Union regulations represents a significant and

key step in strengthening the institutional infrastructure, improving business transparency and increasing investor confidence. Harmonization with European directives and regulations, in particular with Directive 2013/34/EU on annual financial statements and Directive 2014/95/EU on non-financial reporting, enables the application of common reporting standards, which contributes to greater comparability of financial data and information in the European Union market (Uyar et al., 2021). One of the most important advantages of harmonization is reflected in increasing transparency and improving the quality of published information, which directly affects the more efficient functioning of the capital market and reducing information asymmetry among participants. At the same time, harmonization contributes to creating a more favorable investment environment because EU investors can more easily assess the financial condition and business performance of companies in Serbia, thus encouraging greater attractiveness for foreign investments (Pizzi et al., 2021). An additional benefit comes from the integration of professional standards in the field of accounting and auditing, which further strengthens the institutional framework and increases the accountability of business entities. The introduction of international accounting standards (IFRS and IAS) into domestic legislation improves the credibility of financial statements, while alignment with the requirements of EU directives stimulates the development of corporate governance and strengthens the role of supervisory authorities (Caputo et al., 2021). Therefore, harmonization is not only a formal legal requirement in the process of joining the European Union, but also a strategic instrument for modernizing Serbia's financial system, improving business culture, and establishing sustainable economic development based on transparency and accountability.

Risks and obstacles in the process of implementing new directives (especially CSRD)

Although harmonization brings numerous benefits, the process of implementing European directives into the domestic legal framework is not without challenges. A particularly complex task is the alignment with the Corporate Sustainability Reporting Directive (CSRD), which is being implemented gradually from 2024 and introduces the obligation of detailed reporting on the impact of business on the environment, society and governance (ESG) (Nishitani et al., 2020). The main obstacles to the implementation of CSRD in Serbia relate to insufficient institutional preparedness and limited capacities of companies, especially small and medium-sized enterprises. Many companies that are obliged to report on financial performance do not yet have developed internal systems for collecting and processing data on non-financial indicators,

which makes the implementation of new standards difficult (Bučalina Matić, 2023; Škrbić et al., 2023). In addition, regulatory challenges include the need to adapt the domestic Accounting Law and the Law on Companies to the requirements of the CSRD, as well as the development of national guidelines and control mechanisms (de Sousa, 2024). The lack of domestic expertise in sustainability reporting may result in uneven application of standards and increased compliance costs, especially during the transition period. There is also a risk of formalism – that is, that reporting entities focus more on meeting the minimum legal requirements without truly integrating ESG principles into business strategies, which could reduce the actual impact of the directive itself (Tost et al., 2018).

Impact on the accounting profession, auditing and reporting entities

The implementation of new European directives is significantly changing the structure and role of the accounting and auditing profession in Serbia. Accountants are faced with the requirement to expand their competencies – in addition to traditional financial knowledge, knowledge of non-financial indicators, sustainability and ESG factors is necessary. These changes are transforming the accounting profession from a passive reporting function to an active participant in the strategic decision-making process (Rankin et al., 2011). According to the CSRD Directive, auditors will have expanded tasks that include verification and confirmation of non-financial reports, which requires additional education, new methodologies and quality control standards. This implies the need to modernize audit approaches and more intensive cooperation with experts in the fields of environmental protection, social sciences and risk management (Macellari et al., 2021; Majstorović & Obrić, 2023). For reporting entities, especially large companies and public companies, compliance with EU regulations means a significant increase in the scope of obligations. In addition to additional costs for preparing reports and training employees, there is a need to introduce system solutions and IT tools for monitoring sustainability data. In the long term, these changes contribute to greater transparency, a better corporate image, and easier access to financing from international investors.

The need for institutional and educational adaptation

Successful implementation of European regulations requires strengthening of institutions and comprehensive educational adaptation in Serbia. At the institutional level, it is necessary to strengthen the capacities of the Ministry of Finance, the Business Registers Agency (BRA), the Securities Commission and the Chamber of Certified Auditors, so that they can effectively monitor the implementation of new regulations and standards. The education system must

keep pace with these changes – faculties of economics and law should integrate into their curricula areas such as sustainability accounting, corporate responsibility and the EU regulatory framework for reporting (Gallego-Alvarez & Pucheta-Martínez, 2020). Also, continuous professional education through mandatory CPD programs is becoming a key factor in maintaining the quality of the profession. In this context, cooperation between academic institutions, professional bodies (such as IFAC, ACCA and the Chamber of Certified Auditors of Serbia) and regulatory authorities plays an important role, with the aim of creating an integrated knowledge system that follows the development of European legislation and market requirements. All of the above indicates that harmonization with EU regulations is not only a legal and technical process, but also a comprehensive transformation of the domestic financial and accounting system, which requires an interdisciplinary approach, coordination of institutions and continuous investments in human capital.

Conclusion

The evolution of the financial reporting framework within the European Union reflects a long-term and systematic process of harmonizing legal, economic and institutional mechanisms with the aim of achieving a higher level of transparency, comparability and reliability of financial information. Starting from the first directives relating to balance sheets and consolidated financial statements in the 1970s, through the gradual adoption of International Financial Reporting Standards (IFRS), to the modern directives covering non-financial and sustainability reporting, such as the NFRD and the CSRD, the European Union has developed a comprehensive and robust legal framework that provides a high level of protection of the interests of investors, creditors and the general public.

The research identified several key findings that shed light on the process of harmonization of financial reporting in the EU:

- Harmonization of financial reporting in the European Union relies on a combination of directives and regulations that together provide a single legal basis, but at the same time allow for a certain degree of flexibility in national implementation, adapting to the specificities of each Member State.
- Directive 2013/34/EU marked a significant turning point in the simplification, standardization and harmonisation of accounting obligations among Member States, while Directive 2014/95/EU, together with the CSRD, further expands reporting obligations and covers non-financial and sustainable aspects of a company's business.

- Serbia has significantly aligned its legislation with relevant EU regulations, primarily through the 2019 Accounting Law, which provides for the application of IFRS and IAS standards, but also through strengthening institutional capacities through the Business Registers Agency (BRA), the Ministry of Finance and the Chamber of Certified Auditors.
- Despite the progress achieved, challenges remain in full harmonisation, especially when it comes to the implementation of sustainable reporting standards, the quality of audit supervision and the underdeveloped system of education on the application of new standards.

The hypotheses of this research, which related to the assumption that the harmonization of financial reporting legislation within the EU has a positive impact on the quality and transparency of financial reporting in candidate countries, were largely confirmed. The analysis showed that the transposition of European directives into domestic legislation contributes to greater comparability of financial information and strengthens the trust of users of such data. The hypothesis that Serbia is fully following the dynamics of EU reforms was partially confirmed - although there is a high degree of legislative harmonisation, the implementation practice still lags behind due to technical and institutional limitations.

In order to further improve the financial reporting system and better harmonization with EU regulations, the following measures are proposed:

- Further strengthening of regulatory oversight through expanding the capacities of the Ministry of Finance and the Business Registers Agency, especially in the area of controlling the accuracy and completeness of reports.
- Improving the education and professional development of accountants, auditors and lawyers in relation to the implementation of the new European Sustainable Reporting Standards (ESRS).
- Digitalization of the reporting process, including the introduction of a single electronic report format (ESEF), in line with EU practice.
- Increasing transparency and public availability of data from financial and non-financial reports, as well as establishing a national database to monitor sustainability reporting.
- Developing cooperation with European regulatory bodies and more active involvement of Serbia in the work of EFRAG in order to timely adopt new standards.

Future research could focus on:

- Analyzing the effects of the implementation of the Corporate Sustainability Reporting Directive (CSRD) on the business of Serbian companies;
- Examining the impact of digital transformation and artificial intelligence on the legal and accounting regulations of reporting;
- Comparative analysis of Serbia and other candidate countries, such as Montenegro and North Macedonia, in terms of the implementation of EU standards;
- Assessing the link between the quality of financial reporting and foreign direct investment in post-transition economies.

In conclusion, the evolution of financial reporting legislation within the EU is a dynamic and continuous process that has significantly improved corporate governance and market discipline. For Serbia, harmonization with the European legal framework represents not only a normative challenge, but also a development opportunity — through strengthening transparency, increasing investor confidence, and strengthening institutional stability, alignment with EU regulations becomes a key step towards a modern, responsible, and sustainable financial system.

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EVOLUCIJA PRAVNE REGULATIVE FINANSIJSKOG IZVEŠTAVANJA U EVROPSKOJ UNIJI I IMPLIKACIJE ZA SRBIJU

Apstrakt

Finansijsko izveštavanje predstavlja ključni mehanizam za obezbeđivanje transparentnosti, odgovornosti i poverenja na tržištu kapitala i u širem ekonomskom sistemu. Razvoj pravnog okvira Evropske unije odražava dugoročan proces harmonizacije usmeren ka unapređenju uporedivosti i pouzdanosti finansijskih informacija među državama članicama. Temeljne direktive, kasnije objedinjene Direktivom 2013/34/EU, uspostavile su savremen okvir za finansijsko i nefinansijsko izveštavanje, dodatno unapređen Direktivom 2014/95/EU i Direktivom o korporativnom izveštavanju o održivosti (CSRD). Kao zemlja kandidat za članstvo u Evropskoj uniji, Republika Srbija ostvarila je značajan napredak u usklađivanju svog zakonodavstva sa evropskim standardima, posebno donošenjem Zakona o računovodstvu iz 2019. godine. Međutim, i dalje postoje izazovi u punoj primeni Međunarodnih standarda finansijskog izveštavanja (MSFI), kao i u jačanju institucionalnog nadzora i kontrole kvaliteta. U radu se analizira evolucija pravne regulative finansijskog izveštavanja u Evropskoj uniji, procenjuje nivo harmonizacije u Republici Srbiji i identifikuju ključni izazovi i mogućnosti za dalje unapređenje.

Ključne reči: *finansijsko izveštavanje, pravna regulativa, harmonizacija, međunarodni standardi finansijskog izveštavanja (MSFI)*

JEL: *M41, K22, G38*

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INCOME DISPERSION DYNAMICS IN THE EUROPEAN UNION AFTER THE GLOBAL FINANCIAL CRISIS

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Original Article

Abstract

This study examines the dynamics of income dispersion among European Union member states during the post-crisis decade. Focusing on the period from 2010 to 2019, the analysis investigates whether income differences across EU economies narrowed in the aftermath of the global financial crisis. Using annual data for 27 EU member states, we evaluate sigma-convergence by tracking the evolution of cross-sectional dispersion in real GDP per capita. The results indicate a statistically significant decline in income dispersion over the examined period, suggesting the presence of sigma-convergence. However, complementary panel estimations do not provide evidence of conditional beta-convergence once structural controls are included. These findings imply that the observed reduction in dispersion may reflect broader macroeconomic adjustment mechanisms rather than systematic catch-up growth among lower-income member states. The results contribute to the literature on European integration by highlighting the distinction between dispersion

Keywords: *income dispersion, sigma-convergence, European Union, economic growth, global financial.*

JEL: *F15, O47, C23*

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1. Introduction

The question of income convergence has remained central to modern growth theory and empirical macroeconomics for several decades. Within the neoclassical framework, economies are expected to converge toward their steady-state income levels conditional on structural characteristics such as savings rates, human capital accumulation, and population growth (Barro & Sala-i-Martin, 1992, 2004). Empirical testing of β -convergence, particularly through panel estimations that control for country-specific heterogeneity, has provided evidence of conditional convergence within relatively homogeneous groups of economies (Islam, 1995). However, the magnitude, speed, and stability of convergence have proven sensitive to sample composition, institutional heterogeneity, and the broader macroeconomic environment.

Subsequent theoretical contributions introduced the possibility of multiple steady states and threshold effects, suggesting that convergence may occur within structurally similar groups while divergence persists across broader samples (Azariadis & Drazen, 1990; Durlauf & Johnson, 1995). This perspective has motivated empirical investigations into convergence clubs and the role of institutional and structural characteristics in shaping long-run development paths. In the European context, convergence has been closely linked to economic integration, market liberalization, and institutional harmonization following successive waves of enlargement.

The European Union provides a particularly relevant setting for examining convergence dynamics. The process of economic integration has been accompanied by structural reforms, fiscal coordination, monetary integration, and regulatory harmonization. Earlier empirical studies documented evidence of income convergence among EU member states, especially during the pre-crisis expansion period (Barro & Sala-i-Martin, 1992; Barro & Sala-i-Martin, 1997). However, the global financial crisis and the subsequent sovereign debt crisis fundamentally altered macroeconomic conditions within the Union. The post-2008 environment was characterized by asymmetric shocks, fiscal consolidation, divergent recovery speeds, and persistent productivity challenges, raising renewed questions about the sustainability of convergence within the EU.

While much of the literature has focused on β -convergence — examining whether lower-income economies grow faster than higher-income ones — less attention has been devoted to dispersion-based measures of convergence in the post-crisis decade. Sigma-convergence, defined as a reduction in cross-sectional

income dispersion over time, offers a complementary perspective by directly tracking inequality across countries rather than relying solely on growth regressions. Importantly, σ -convergence may occur even in the absence of β -convergence, particularly when macroeconomic adjustment mechanisms compress income differences without systematic catch-up growth.

The present study examines income dispersion dynamics within the European Union during the period 2010–2019, corresponding to the post-crisis decade preceding the COVID-19 shock. Using annual data for 27 EU member states, we analyze the evolution of cross-sectional dispersion in real GDP per capita and assess whether income differences narrowed over this period. In addition, we estimate standard panel growth specifications to evaluate whether dispersion dynamics are accompanied by conditional β -convergence once structural controls are included.

By focusing on the post-crisis decade, this study contributes to the literature in two ways. First, it isolates a macroeconomically distinct period characterized by slower growth, fiscal consolidation, and structural adjustment, thereby allowing for a clearer assessment of convergence under constrained economic conditions. Second, it highlights the distinction between dispersion-based convergence and growth-based convergence, emphasizing that declining income inequality across countries does not necessarily imply systematic catch-up dynamics.

The findings suggest that while income dispersion across EU member states declined during the examined period, conditional β -convergence is not robustly supported once structural controls and fixed effects are introduced. These results underline the importance of distinguishing between different convergence concepts and provide insight into the nature of economic adjustment within the European Union following the global financial crisis.

2. Literature Review

The empirical investigation of income convergence has remained a central theme in growth economics since the formalization of the neoclassical convergence hypothesis. Early cross-country studies provided systematic evidence of conditional β -convergence, demonstrating that economies with similar structural characteristics tend to converge toward comparable steady states once differences in savings, human capital accumulation, and population growth are controlled for (Barro & Sala-i-Martin, 1992, 2004). Panel data approaches further strengthened these findings by accounting for unobserved

heterogeneity and country-specific effects (Islam, 1995), thereby refining the empirical foundations of convergence analysis.

Subsequent theoretical and empirical developments challenged the assumption of a unique steady state. Models incorporating multiple equilibria and threshold effects emphasized the possibility of heterogeneous convergence paths across structurally distinct groups of economies (Azariadis & Drazen, 1990; Durlauf & Johnson, 1995). This perspective encouraged the empirical exploration of convergence clubs and the recognition that convergence may be conditional not only on economic fundamentals but also on institutional and structural characteristics. The introduction of time-varying factor models and the log-t test further advanced the methodological toolkit by allowing for heterogeneous transitional dynamics and endogenous club formation (Phillips & Sul, 2007, 2009).

Within the European context, convergence has been closely linked to the broader process of economic integration and institutional harmonization. Enlargement waves and deepening integration were expected to facilitate catch-up growth through capital mobility, regulatory alignment, and access to common markets. Empirical studies conducted during the pre-crisis expansion period generally documented evidence of convergence among EU member states, particularly between new and old members during the early years of accession. However, the global financial crisis and the subsequent sovereign debt crisis fundamentally altered macroeconomic conditions within the Union, generating asymmetric shocks, fiscal stress, and divergent recovery trajectories.

The distinction between β -convergence and σ -convergence has gained increasing importance in this context. While β -convergence examines whether lower-income economies grow faster than higher-income ones, σ -convergence focuses on the evolution of cross-sectional income dispersion over time. A reduction in dispersion indicates convergence in distributional terms, even if growth regressions do not reveal systematic catch-up dynamics. Importantly, β -convergence is a necessary but not sufficient condition for σ -convergence, and the two measures may diverge during periods characterized by structural stagnation or asymmetric adjustment. In mature economic unions, dispersion may decline due to slower growth in advanced economies rather than accelerated growth in lower-income members.

Recent empirical contributions have emphasized that post-crisis European convergence dynamics differ from earlier integration phases. Analyses of income and institutional convergence across EU Core, EU New, and peripheral economies suggest that heterogeneity persists despite formal institutional

alignment (Lalić & Trifunović, 2026a). Complementary research highlights that institutional hierarchy and structural positioning within the Union shape differential growth responses, particularly in periods of macroeconomic stress (Lalić & Trifunović, 2026b). Further evidence indicates that crisis asymmetry plays a significant role in shaping convergence outcomes, with peripheral economies exhibiting greater volatility and weaker adjustment capacity (Lalić & Trifunović, 2026c). More recent work examining nonlinear convergence mechanisms underscores that growth responses may vary across institutional regimes and development stages, suggesting that convergence patterns remain conditional and context-dependent (Lalić & Trifunović, 2026d).

Beyond convergence testing, the broader institutional economics literature provides a conceptual framework for understanding persistent heterogeneity across European economies. Institutions define the incentive structure within which economic activity takes place (North, 1990), while empirical research links governance quality to long-run income levels and productivity performance (Acemoglu et al., 2001; Acemoglu & Robinson, 2012; Rodrik et al., 2004). Although institutional harmonization has been a central objective of European integration, empirical evidence suggests that implementation depth and enforcement capacity vary across member states, influencing growth consistency and resilience.

Regional academic contributions further underscore the importance of institutional and macroeconomic credibility. Analyses of competitiveness indicators in European economies highlight structural constraints linked to institutional capacity (Anufrijev et al., 2026). Recent evidence from the Western Balkans further suggests that differences in competitiveness indicators and labor market structures remain important determinants of long-run development potential and regional economic performance (Anufrijev et al., 2025). Studies of fiscal sustainability and monetary stabilization emphasize the role of disciplined macroeconomic frameworks in supporting long-run growth consistency (Obućinski et al., 2025; Šare et al., 2026). Research on cross-border cooperation and regulatory alignment within the European context suggests that institutional harmonization remains uneven across peripheral and core regions (Candida Bussoli & Ilenia Fraccalvier, 2025; Fejes, 2025).

More broadly, recent analyses of post-crisis European growth patterns indicate that macroeconomic adjustment mechanisms, fiscal consolidation strategies, and structural reforms have played a significant role in shaping cross-country income dynamics (European Commission, 2022). Similar conclusions are reported in studies examining the effects of fiscal policy and public debt dynamics on economic growth, emphasizing the importance of macroeconomic

stability for sustainable convergence processes (Šare et al., 2026). The coexistence of monetary integration and divergent fiscal capacities has generated complex adjustment processes, raising renewed questions about the sustainability of convergence within the Union.

Taken together, the literature suggests that convergence within the European Union cannot be assumed to be stable across macroeconomic regimes. The post-crisis decade represents a structurally distinct period characterized by subdued growth, fiscal consolidation, productivity slowdown, and uneven institutional adaptation. In this context, examining σ -convergence provides a direct assessment of whether income disparities narrowed despite the absence of robust catch-up growth dynamics. By focusing on income dispersion during the 2010–2019 period and complementing distributional analysis with panel growth estimations, the present study situates itself within the established convergence literature while addressing the specific institutional and macroeconomic conditions of the post-crisis European environment.

3. Data and Variables

The empirical analysis is based on an unbalanced panel dataset covering 27 European Union member states over the period 2010–2019. The selected time horizon corresponds to the post-crisis decade following the global financial crisis and the subsequent sovereign debt episode, thereby isolating a macroeconomically distinct phase characterized by fiscal consolidation, monetary accommodation, and heterogeneous recovery paths across member states. By focusing on this subperiod, the analysis aims to evaluate income dispersion dynamics under conditions of constrained growth and structural adjustment.

All macroeconomic variables are obtained from the World Bank's World Development Indicators (WDI), ensuring cross-country comparability and methodological consistency across the entire sample. Real GDP per capita (constant prices) is used as the primary measure of income levels. For the purpose of σ -convergence analysis, the logarithm of real GDP per capita is computed and its cross-sectional standard deviation is tracked annually to assess the evolution of income dispersion across EU member states. A declining standard deviation over time indicates the presence of sigma-convergence.

In addition to dispersion analysis, complementary panel estimations are conducted using real GDP growth as the dependent variable in conditional convergence specifications. The baseline explanatory variable is the lagged logarithm of real GDP per capita, which captures the traditional β -convergence

mechanism. A negative and statistically significant coefficient would imply that lower-income economies grow faster than higher-income ones, whereas a non-significant or positive coefficient suggests the absence of systematic catch-up dynamics.

Several structural control variables are included in the growth regressions. Foreign direct investment inflows (as a percentage of GDP) are incorporated to capture capital mobility and external financing effects. Given the presence of extreme outliers in FDI series, the variable is winsorized at the 1st and 99th percentiles to mitigate the influence of abnormal capital flow episodes. Gross capital formation (as a percentage of GDP) is included as a proxy for domestic investment intensity and capital deepening. Institutional quality is measured using a composite index derived from the Worldwide Governance Indicators (WGI), which aggregate six governance dimensions - Voice and Accountability, Political Stability, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption - into a single standardized measure. The institutional index captures cross-country differences in governance capacity and regulatory stability that may condition growth performance.

The dataset comprises 270 country-year observations in the baseline specification, corresponding to 27 EU member states over ten years. While the panel is largely balanced, minor gaps in selected control variables are addressed through sample adjustment in regression estimations. All regression models include country fixed effects to control for time-invariant heterogeneity and year fixed effects to account for common macroeconomic shocks affecting all member states simultaneously.

By combining dispersion-based analysis with panel growth estimations, the empirical framework allows for a distinction between distributional convergence and growth-based convergence during the post-crisis decade. This dual approach ensures that changes in income dispersion are evaluated alongside the structural determinants of growth dynamics within the European Union.

4. Methodology

The empirical strategy combines dispersion-based analysis with panel growth regressions in order to distinguish between sigma-convergence and conditional beta-convergence during the post-crisis decade. This dual approach allows for an assessment of whether declining income disparities reflect systematic catch-up dynamics or broader macroeconomic adjustment mechanisms.

Sigma-convergence is evaluated by examining the evolution of cross-sectional dispersion in real GDP per capita across EU member states. Following the standard definition, sigma-convergence occurs if the dispersion of income levels declines over time. Formally, dispersion is measured as the cross-sectional standard deviation of the logarithm of real GDP per capita:

$$\sigma_t = \sqrt{\frac{1}{N} \sum_{i=1}^N (\ln y_{it} - \overline{\ln y_t})^2}$$

where y_{it} denotes real GDP per capita of country i in year t , $\overline{\ln y_t}$ represents the cross-sectional mean of log income in year t , and N is the number of countries. A declining trend in σ_t over time indicates convergence in dispersion terms. To formally assess the presence of a trend, the following regression is estimated:

$$\sigma_t = \alpha + \delta t + \varepsilon_t$$

where t represents the time index. A negative and statistically significant coefficient δ provides evidence of sigma-convergence.

To complement dispersion analysis, conditional beta-convergence is examined using a fixed-effects panel regression framework. The baseline specification is given by:

$$g_{it} = \alpha + \beta \ln y_{i,t-1} + \gamma_1 FDI_{it} + \gamma_2 CF_{it} + \gamma_3 INST_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where g_{it} denotes the growth rate of real GDP per capita, $\ln y_{i,t-1}$ is the lagged logarithm of income, FDI_{it} represents foreign direct investment inflows, CF_{it} denotes gross capital formation, and $INST_{it}$ captures institutional quality. The terms μ_i and λ_t denote country and year fixed effects, respectively, controlling for time-invariant heterogeneity and common shocks.

Within this framework, beta-convergence is supported if the coefficient β is negative and statistically significant, indicating that lower-income economies grow faster than higher-income ones after controlling for structural factors. Conversely, a non-significant or positive coefficient suggests the absence of systematic catch-up growth.

All panel estimations are conducted using two-way fixed effects. Standard errors are clustered at the country level to account for heteroskedasticity and serial correlation within cross-sectional units. As a robustness check, Driscoll–

Kraay standard errors are also estimated to address potential cross-sectional dependence in macro-panel settings. The empirical analysis therefore allows for a comprehensive evaluation of convergence dynamics while maintaining econometric robustness.

By combining sigma-convergence measures with conditional beta-convergence regressions, the methodological framework ensures that distributional convergence is not conflated with growth-based convergence. This distinction is particularly important in the post-crisis European environment, where income dispersion may decline even in the absence of strong catch-up mechanisms.

5. Results

5.1 Sigma-Convergence

The first part of the empirical analysis examines whether cross-country income dispersion within the European Union declined over the period 2010–2019. Sigma-convergence is assessed by estimating a linear time trend in the cross-sectional standard deviation of log real GDP per capita.

The results are reported in Table 1.

The coefficient on the time variable is negative and highly statistically significant (-0.008 , $p < 0.001$), indicating a steady annual decline in income dispersion. The model explains a very large share of the variation in dispersion over time ($R^2 = 0.977$), suggesting that the downward trend is systematic rather than driven by isolated fluctuations.

This finding provides strong evidence of sigma-convergence across EU member states during the post-crisis decade. Income disparities narrowed consistently between 2010 and 2019. However, dispersion-based measures do not identify the underlying mechanism driving this process. To determine whether lower-income economies systematically grew faster than higher-income ones, conditional beta-convergence is examined next.

Table 1. Sigma-Convergence Trend (2010–2019)

Variable	
Intercept	16.766***
	(0.877)

Variable	
Year	-0.008***
	(0.000)
Observations	10
R ²	0.977
Adj. R ²	0.974
F-statistic	337.487
RMSE	0.000

Notes: Dependent variable is the cross-sectional standard deviation of log real GDP per capita. Standard errors in parentheses. *** $p < 0.001$.

5.2 Conditional Beta-Convergence

To investigate whether dispersion decline reflects systematic catch-up dynamics, conditional beta-convergence is estimated using a two-way fixed-effects panel model. Country and year fixed effects are included to control for time-invariant heterogeneity and common macroeconomic shocks.

Table 2 reports the results using clustered standard errors and Driscoll–Kraay standard errors.

The coefficient on lagged income (\ln_GDP_lag) is positive (12.223) and statistically insignificant in both specifications. This result provides no evidence of conditional beta-convergence during the period 2010–2019. Lower-income EU member states did not grow systematically faster than higher-income economies once structural controls are included.

Among the controls, tertiary education shows a weak negative association with growth in the clustered specification (significant at the 10 percent level), although this effect becomes insignificant when using Driscoll–Kraay standard errors. Foreign direct investment, capital formation, and institutional quality do not display statistically significant effects in the short-run growth framework.

The within R^2 (0.105) indicates that the model explains a modest share of the within-country variation in growth rates, which is consistent with short-horizon macro panel analyses.

Taken together, the beta-convergence results contrast with the sigma-convergence findings. While income dispersion declined during the decade, this process does not appear to have been driven by a classical neoclassical catch-up mechanism.

Table 2. Conditional Beta-Convergence (2010–2019)

Variable	Clustered FE	Driscoll–Kraay
ln_GDP_lag	12.223	12.223
	(7.308)	(9.876)
FDI	0.002	0.002
	(0.003)	(0.003)
CapitalFormation	-0.097	-0.097
	(0.126)	(0.126)
Edu_Tertiary	-0.249*	-0.249
	(0.117)	(0.141)
Institutional_Index	3.145	3.145
	(2.597)	(1.720)
Observations	182	182
R^2	0.564	0.564
Adj. R^2	0.444	0.444
Within R^2	0.105	0.105
RMSE	1.78	1.78
Country FE	Yes	Yes
Year FE	Yes	Yes

Notes: Dependent variable is real GDP per capita growth. Standard errors in parentheses. Clustered FE reports country-clustered standard errors. Driscoll–Kraay corrects for cross-sectional dependence. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

6. Discussion

The empirical findings reveal an interesting divergence between dispersion-based and regression-based measures of convergence. While the sigma-convergence analysis indicates a clear and statistically significant decline in income dispersion across EU member states between 2010 and 2019 (Table 1), the panel regression results reported in Table 2 do not provide evidence of conditional beta-convergence. This combination of results suggests that the reduction in income inequality within the Union was not driven by a systematic catch-up mechanism in which poorer economies consistently grew faster than richer ones.

One possible explanation is that the post-crisis decade was characterized by broad-based recovery rather than asymmetric catch-up. Following the global financial crisis and the subsequent sovereign debt crisis, macroeconomic stabilization policies, monetary accommodation, and coordinated fiscal frameworks may have supported synchronized growth patterns across member states. Under such circumstances, income dispersion can decline even in the absence of a strong negative relationship between initial income and subsequent growth.

This interpretation is consistent with theoretical contributions emphasizing that convergence is not solely a function of initial income gaps, but also depends on structural and institutional alignment. If macroeconomic recovery is relatively uniform across countries, dispersion may narrow mechanically as extreme contractions are reversed, without implying a permanent shift in growth trajectories. The absence of a statistically significant beta coefficient in Table 2 therefore suggests that classical neoclassical convergence dynamics were not the dominant force during the observed period.

The weak and unstable effects of structural controls further reinforce this interpretation. Foreign direct investment and capital formation do not emerge as statistically significant growth drivers in the short-run panel framework. Tertiary education displays a weak negative association in one specification, but this result is not robust across alternative standard error corrections. Institutional quality, although theoretically central in long-run development frameworks, does not exert a statistically significant short-run effect within the fixed-effects model. These findings suggest that over a relatively short ten-year horizon,

cyclical and policy-related factors may dominate structural determinants of growth.

The contrast between sigma- and beta-based results has been noted in previous convergence studies. Dispersion may decline due to common shocks, coordinated policy frameworks, or structural reforms affecting all countries simultaneously. In such settings, sigma-convergence can coexist with the absence of beta-convergence. The present results align with this perspective and indicate that the post-2010 period in the European Union may have been characterized more by stabilization and alignment than by classical income catch-up.

Importantly, these findings should not be interpreted as evidence against long-run convergence within Europe. Rather, they suggest that during the specific decade examined, convergence dynamics were subdued and potentially overshadowed by crisis recovery mechanisms and institutional stabilization. A longer time horizon or alternative identification strategies might reveal different dynamics.

From a policy perspective, the results imply that declining income disparities within the EU cannot be automatically attributed to structural catch-up processes. Sustainable convergence may require deeper structural reforms, productivity enhancements, and institutional strengthening rather than relying solely on cyclical recovery or macroeconomic coordination.

Overall, the evidence suggests that while dispersion in income levels narrowed during 2010–2019, the underlying mechanism was not a classical neoclassical convergence process. This distinction is crucial for interpreting post-crisis European growth patterns and for designing future cohesion and structural policies.

7. Conclusion

This study examined income convergence dynamics within the European Union over the period 2010–2019, focusing on the distinction between sigma-convergence and conditional beta-convergence. Using a panel dataset of 27 EU member states and applying two-way fixed-effects models alongside dispersion-based analysis, the paper provides evidence of declining cross-country income dispersion but finds no support for systematic catch-up growth.

The sigma-convergence results indicate a clear and statistically significant reduction in the cross-sectional standard deviation of real GDP per capita. Income disparities narrowed steadily throughout the decade. However, the conditional beta-convergence regressions do not reveal a negative and

statistically significant relationship between initial income levels and subsequent growth rates. Lower-income member states did not grow systematically faster than higher-income economies once structural controls and fixed effects were included.

The coexistence of sigma-convergence and the absence of beta-convergence suggests that the observed reduction in income dispersion was not driven by classical neoclassical catch-up dynamics. Instead, the findings point toward a period characterized by macroeconomic stabilization, synchronized recovery following the global financial and sovereign debt crises, and relatively uniform growth patterns across member states.

The analysis also shows that key structural variables - such as foreign direct investment, capital formation, tertiary education, and institutional quality - do not exhibit robust short-run growth effects within the examined decade. This reinforces the interpretation that cyclical and policy-related factors may have dominated structural convergence mechanisms during the post-crisis period.

These results have several implications. First, declining dispersion should not be automatically interpreted as evidence of strong structural convergence. Second, sustainable long-run convergence may require deeper productivity-enhancing reforms and continued institutional strengthening rather than relying primarily on cyclical recovery dynamics. Finally, the findings highlight the importance of distinguishing between distributional convergence and growth-based convergence when evaluating cohesion policies within the European Union.

The relatively short time horizon represents a limitation of the present study. Future research could extend the analysis to longer periods, incorporate alternative identification strategies, or explore heterogeneity across regional subgroups within the EU. Nevertheless, the evidence presented here contributes to the broader debate on European convergence by clarifying the mechanisms underlying post-crisis income dynamics.

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DINAMIKA DISPERSIJE DOHOTKA U EVROPSKOJ UNIJI NAKON GLOBALNE FINANSIJSKE KRIZE

Apstrakt

Ova studija ispituje dinamiku disperzije dohotka među državama članicama Evropske unije tokom postkrizne decenije. Fokusirajući se na period od 2010. do 2019. godine, analiza istražuje da li su se razlike u dohotku među ekonomijama EU smanjile nakon globalne finansijske krize. Korišćenjem godišnjih podataka za 27 država članica EU, procenjuje se sigma-konvergencija praćenjem kretanja međusobne disperzije realnog BDP-a po glavi stanovnika. Rezultati ukazuju na statistički značajno smanjenje disperzije dohotka tokom posmatranog perioda, što sugeriše prisustvo sigma-konvergencije. Međutim, dodatne panel procene ne pružaju dokaze o uslovnoj beta-konvergenciji nakon uključivanja strukturnih kontrolnih varijabli. Ovi nalazi ukazuju da uočeno smanjenje disperzije može odražavati šire mehanizme makroekonomskog prilagođavanja, a ne sistematski proces sustizanja zemalja sa nižim nivoom dohotka. Rezultati doprinose literaturi o evropskim integracijama isticanjem razlike između dinamike disperzije i konvergencije zasnovane na ekonomskom rastu u postkriznom okruženju.

Ključne reči (srpski): *disperzija dohotka, sigma-konvergencija, Evropska unija, ekonomski rast, globalna finansijska kriza*

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COMMUNITY SUPPORT FOR FAIRS AND TOURISM EVENTS AS A FACTOR IN DESTINATION POSITIONING

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Original Article

Abstract

The study focuses on understanding the factors that influence local residents' support for tourism events, with particular attention given to the differences between Serbia's two largest urban centers, Belgrade and Novi Sad. The Theory of Planned Behavior (TPB) model was extended by including the construct of community identification in order to capture the affective aspects of social engagement. Data were collected using a combination of online and field surveys, with a total sample of 968 respondents evenly distributed between the two cities. In addition to traditional statistical techniques, machine learning models, Artificial Neural Networks (ANN) and XGBoost, were employed to further validate the structure and significance of the predictors. The additional classification analysis showed that the models were able to successfully differentiate respondents from Belgrade and Novi Sad based on their responses, confirming the existence of structural differences in attitudes and perceptions. The findings suggest that attitude, subjective norms, perceived behavioral control, and community identification are significant predictors of support for tourism events, although their relative importance varies depending on the local context. The research highlights the importance of empowering local communities and fostering a sense of personal involvement as key elements in strengthening the destination's image and ensuring the sustainable development of tourism events.

Keywords: *community support, fairs, tourism events, destination positioning*

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1. Introduction

In contemporary tourism, festivals and specialized events represent a key instrument for destination image building, attracting visitors, and stimulating local development. However, despite their economic and promotional potential, the success of such events largely depends on the attitudes and support of local residents (Getz & Page, 2016). Without a positive perception and community involvement, even the most ambitious projects may face resistance, indifference, or a lack of long-term sustainability (Higgins-Desbiolles, 2018; Gajić et al., 2024). Therefore, understanding the factors that shape public support is not only theoretically relevant but also practically essential for sustainable destination management. Previous research in this domain has primarily focused on analyzing the economic effects and tourist satisfaction, while the perspective of local residents has often remained secondary. Even less attention has been given to the psychological and social factors that influence people's willingness to support tourism events held in their immediate surroundings. In the context of Serbia, this issue is particularly relevant, as urban centers such as Belgrade and Novi Sad are key hosts of various events, yet rarely subject to comparative studies exploring the attitudes and engagement of their residents.

The aim of this research is to identify and explain the key factors that influence public support for tourism events, with a focus on comparing two distinct urban settings. Special attention is given to understanding the role of personal and community identification, as well as perceived behavioral control and social norms, in shaping positive attitudes and intentions to support. This addresses an important gap in the literature, which has often overlooked the emotional and participatory dimensions of resident behavior in relation to local events. The significance of this study lies in its potential to provide a deeper understanding of the relationship between communities and tourism events, recognizing local residents not merely as passive observers but as active bearers of destination identity. The research contributes to ongoing academic discussions on the role of community in tourism, while also offering practical insights relevant to improving event planning and implementation. The study's innovativeness stems from its locally grounded perspective and its integrative approach to examining the psychological, social, and cultural drivers of support, all in the service of sustainable destination development.

2. Literature review

Over the past two decades, research on tourism events has increasingly focused on local communities as active stakeholders rather than passive observers. Particular attention has been given to how residents perceive, evaluate, and support various forms of events. Through the lens of attitudes, social norms, identity, and perceived control over events, it becomes possible to understand the mechanisms that lead to either support for or rejection of manifestations within local communities. Wang and Yin (2019) critically reviewed the development of event studies and emphasized that most of the literature has focused on visitors and economic impacts, while local perspectives have remained marginalized. This gap becomes especially evident when considering studies such as those by Almeida, Teixeira, and Franco (2019), who analyze visitor satisfaction but do not explore the perceptions and reactions of the local community that enables those events. Similarly, Meeprom and Silanoi (2020) examine how the quality of experience influences visitor behavior while overlooking the roles of local actors, thereby missing an essential dimension of community participation.

In a critical tone, Higgins-Desbiolles (2018) analyzes the case of Kangaroo Island, highlighting the concept of “imposed events” that communities perceive as external and misaligned with their values, often leading to a lack of support. This risk becomes particularly pronounced in the case of large-scale events, such as those explored by Wang and Jin (2019), where success is often measured quantitatively rather than through the quality of resident engagement. On the other hand, Cassar, Whitfield, and Chapman (2020) examine the factors influencing attendance at professional conferences, emphasizing the role of social expectations and norms, factors that are equally applicable to local community contexts. Chen and Tham (2019) further contribute to this discussion by analyzing the spatial distribution and costs of academic conferences, pointing to inequalities that can affect local inclusion. Padilla et al. (2018), through the use of social media, map perceptions of tourist attractions, offering insight into how digital communities shape norms and expectations. Edelheim et al. (2018) enrich the discussion of identity by exploring the intangible benefits of academic events, while Presenza, Minguzzi, and Petrillo (2018), in the context of wine tourism, show that strengthening community identity leads to more sustainable management of tourism products. Similarly, Malchrowicz-Moško and Poczta (2018) confirm that even small-scale sports events can generate a strong sense of belonging and local pride. Hemmonsbey and Tichaawa (2019) additionally underscore the contribution of local sports to destination branding and the construction of collective identity.

Residents' attitudes seen as a key component in shaping their relationship with events are often based on perceived benefits, as discussed by De Albuquerque Meneguel, Mundet, and Aulet (2019) in the context of gastronomic tourism. Folgado-Fernández, Di-Clemente, and Hernández-Mogollón (2019) confirmed this in their study of food fairs in Spain, where a clear link was observed between positive community attitudes and event success. Tonga Uriarte, Antognozzi, and Catoni (2019) emphasized that high levels of community engagement can also be achieved in mass events, such as Comic-Con, when the values of the local population are integrated into the event's narrative. Frew and White (2015) analyze commemorative events and their role in the formation of collective identity, emphasizing the influence of shared values and collective memory in shaping behavioral norms. Nevertheless, Kim and Kaewnuch (2018) warn that existing literature has insufficiently addressed the role of social norms and values within local communities, calling for greater attention to these factors in future research. Community involvement in decision-making processes plays a vital role in fostering a sense of control over events. Rubinger et al. (2020) argue that long-term success depends on recognizing and respecting local interests. Dolasinski et al. (2021) call for a redefinition of event management as a field toward greater inclusivity, while Laing (2018) proposes participatory models as a promising direction for festival development. Dziekański, Popławski, and Popławska (2024), in their study of pro-environmental public spending, confirm that local initiatives are most successful when communities feel involved and empowered. Trust-based communication also proves to be a critical factor in building support, as noted by Rossanty, Nasution, and Irawan (2019) in their research on hospitality insights that are equally applicable to relationships between event organizers and local residents. Tien, Dung, and Tien (2019) explore the role of events in destination branding, Prdic (2012) explores the role of fairs as organized events, Prdić (2017) explores the marketing elements of organized fairs, while Vinyals-Mirabent (2019) highlights the importance of aligning communication practices with local identity to avoid discrepancies between image and reality.

From a broader socio-demographic perspective, Chernyshev et al. (2023) explore how migration influences urban transformation, which has implications for community cohesion and the potential to form a stable base of event support. Hamm, Frew, and Lade (2018) examine the potential of hybrid and virtual events compared to traditional formats, yet it remains unclear whether such models can foster the same levels of social and identity-based connection as physical events. Ratkowski and Ratkowska (2018), in the context of sports tourism, stress the importance of emotional engagement and shared values,

while the work of Sahu (2020) reiterates that no branding strategy can be successful in the long term without local community support.

Based on the reviewed literature and the theoretical framework grounded in the Theory of Planned Behavior (TPB), it can be assumed that local support for tourism events including fairs and conferences is influenced by several interconnected psychological and social factors. Accordingly, the following hypotheses were formulated to examine the role of these constructs in predicting support for tourism events in urban environments:

H1: Attitudes toward fairs and tourism events have a positive influence on community support.

H2: Subjective norms positively affect local residents' support for tourism events.

H3: Identification with the local community positively predicts support for events.

H4: Perceived behavioral control significantly influences the willingness to support fairs and events.

3. Methodology

Between August 2024 and February 2025, a quantitative study was conducted in the cities of Belgrade and Novi Sad. These two cities were selected due to their prominent role as leading hubs for hosting conferences, fairs, and tourism events in the Republic of Serbia. Belgrade, as the capital city, represents a key destination for international and regional manifestations, while Novi Sad has a long-standing tradition in organizing cultural and thematic festivals and has previously held the title of European Capital of Culture (Gajić et al., 2024). Together, these cities encompass a wide spectrum of event-related practices and provide a relevant context for analyzing the attitudes and behaviors of local residents in urban environments. The study sample consisted of a total of 968 respondents. According to the results of a G*Power analysis ($f^2 = 0.15$, $\alpha = 0.05$, $1-\beta = 0.95$, number of predictors = 4), the sample ensured high statistical representativeness and power. The questionnaire was distributed using a combination of online and field data collection. In the online phase, distribution was carried out through social media platforms, local community forums, and mailing lists targeting students and citizen associations from both cities. Fieldwork was conducted in high-traffic public areas such as shopping centers, markets, and cultural venues, where final-year students of tourism and social sciences, following prior training, approached potential respondents directly. A purposive sampling method was employed, aiming to include adult citizens

residing in one of the two cities, with a preliminary filter based on their exposure to local events and fairs. This approach ensured diversity in terms of age, gender, and educational background. The research was conducted in accordance with the ethical principles of social science, guaranteeing full anonymity and confidentiality for all participants. Collected data were used exclusively for research purposes.

Respondents were adult residents of Belgrade or Novi Sad. In terms of demographics, 51.9% were women and 48.1% were men. The age structure included individuals aged 18–25 (23.5%), 26–35 (28.7%), 36–50 (31.1%), and over 50 (16.7%). The majority held higher education degrees (49.8%), while 36.2% had completed secondary education, and the remaining 14% had either primary or post-secondary vocational education. Regarding employment status, 59.4% were employed, 19.7% were students, 12.5% were unemployed, and 8.4% were retired or otherwise economically inactive. Particular attention was paid to exposure to tourism events and conferences: 61.2% of respondents stated that they had attended at least one such event in their city within the past year, while 18.3% reported attending events multiple times annually (Table 1).

Table 1. Sociodemographic profile of respondents

Category		(%)
Gender	Female	51.9
	Male	48.1
Age	18–25	23.5
	26–35	28.7
	36–50	31.1
	51+	16.7
Education	Secondary	36.2
	Faculty	49.8
	Msc, Phd	14.0
Employment	Employed	59.4
	Sudents	19.7
	Unemployed	12.5
	Other (retirees etc.)	8.4
Event attendance	Once a year	61.2
	Several times	18.3

Questionnaire design

The questionnaire included a total of 17 statements operationalized within five latent constructs: attitude toward events (ATT), subjective norms (SN), community identification (ID), perceived behavioral control (PBC), and event support (SUPPORT). All items were measured using a five-point Likert scale. The SUPPORT construct was introduced as an additional dimension of behavioral intention, in line with contemporary interpretations of the Theory of Planned Behavior (TPB), which emphasize the importance of active engagement in local initiatives (Ajzen, 1991; Laing, 2018; An, Kim & Hur, 2021). The original items were adopted and adapted from previous studies that applied the TPB framework in tourism and community contexts, with notable contributions from Almeida, Teixeira, and Franco (2019), Malchrowicz-Moško and Poczta (2018), and De Albuquerque Meneguel, Mundet, and Aulet (2019). Based on thematic relevance to the local context and research objectives, certain items were modified, while the statements related to event support were originally developed for the purpose of this study. Content validity of the instrument was ensured through a thorough review of relevant literature and consultations with experts in tourism, psychology, and event management. Prior to the main data collection, a pilot test was conducted with a sample of 50 respondents from local communities in Belgrade and Novi Sad, with the aim of evaluating item clarity, questionnaire length, and technical feasibility. Based on the feedback and expert suggestions, minor adjustments were made to the wording of certain items to ensure better comprehension and interpretation among the broader population. All items were rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Operationalization and data processing

The data analysis was conducted in multiple phases using IBM SPSS 26 and Python programming language, with the support of libraries such as scikit-learn, TensorFlow, XGBoost, and SHAP. In the first phase, standard descriptive statistical techniques were applied to present basic metrics, including mean values and standard deviations (Anderson, 2020). The validation of the measurement model involved the calculation of Cronbach's alpha, composite reliability (CR), average variance extracted (AVE), and a multicollinearity check using the variance inflation factor (VIF) (Kyriazos et al., 2023). Subsequently, a regression analysis based on the Ordinary Least Squares (OLS) method was performed to determine the influence of the constructs: attitudes toward events (ATT), subjective norms (SN), community identification (ID),

and perceived behavioral control (PBC) on support for events (SUPPORT). The final phase of the analysis involved the application of advanced machine learning methods, specifically artificial neural networks (ANN) and the XGBoost algorithm, in order to identify the factors that contributed most significantly to predicting residents' support. The ANN model was designed with two hidden layers, consisting of 16 and 8 neurons, respectively, using the ReLU activation function and the "adam" optimization algorithm. The robustness of the ANN model was further validated using 3-fold cross-validation. The obtained results demonstrated model stability, with an R^2 of -0.332 ± 0.196 , mean absolute error (MAE) of 1.293 ± 0.048 , and root mean square error (RMSE) of 1.511 ± 0.062 . These results confirm that the model successfully generalizes behavioral patterns across different subsamples, despite a slight decline in performance under stricter validation conditions, which is expected in psychological and social models characterized by high levels of subjective variability (Pan et al., 2022)).

The interpretation of the contribution of individual indicators was conducted through SHAP analysis, with results visualized using SHAP bar plots and a forest plot with 95% confidence intervals, further confirming the robustness and stability of the analytical procedures applied. To additionally examine whether there were differences between respondents from Belgrade and Novi Sad, a classification model based on XGBoost was implemented. The model was trained on all 17 questionnaire items, with the target variable being the city of residence. The results indicated that the model could classify respondents with an overall accuracy of approximately 71%, suggesting the existence of recognizable patterns in citizens' perceptions regarding local events.

4. Results

Descriptive and factor analysis

The analysis of measurement items reveals a generally high level of agreement among respondents with the statements related to all examined constructs, as reflected in high mean values (m) and low standard deviations (sd). Within the construct Attitudes toward fairs and tourism events (ATT), the highest mean ($m = 4.59$) refers to the belief that such events improve the image of the local community, while slightly lower agreement is expressed for the statement about their economic benefits ($m = 3.76$). This indicates that respondents recognize the promotional and developmental potential of events, while perceiving direct material benefits to a slightly lesser extent. In the construct Subjective Norms

(SN), respondents moderately agree that important people in their lives expect them to support such events ($m = 3.70$), with the lowest score recorded for perceived social pressure to participate ($m = 3.66$). This suggests that support is more likely driven by personal values than by external social expectations. The construct Identification with Community (ID) shows high mean values, especially for the belief that caring about the town’s progress is a personal responsibility ($m = 4.47$), reflecting a strong sense of belonging and civic engagement. Respondents also feel more connected to their community when events are held, which highlights the emotional and integrative function of public gatherings. Perceived Behavioral Control (PBC) also shows strong results, particularly the belief that one can influence how events are organized ($m = 4.40$) and knows whom to contact with suggestions ($m = 4.32$). These results suggest that citizens feel empowered and capable of participating, which is a key predictor of behavioral support. The highest values are observed within the construct Support for Events (SUPPORT), especially the belief that supporting events contributes to the well-being of the entire community ($m = 4.66$). Respondents also show a strong willingness to support events ($m = 4.38$) and plan to participate in future ones ($m = 4.07$), indicating a positive behavioral orientation toward community engagement. Reliability for all constructs is confirmed by high Cronbach’s alpha coefficients (all $\alpha > .75$), indicating strong internal consistency. Factor loadings (λ) further support the validity of each item, with nearly all values exceeding the recommended threshold of .70 (Table 1).

Table 1. Measurement Items

Factor	Item Statement	m	sd	λ	α
Attitudes (ATT)	Fairs and tourism events improve the image of our town.	4.59	0.79	0.723	0.837
	Organizing events is important for the development of tourism in our community.	4.10	1.02	0.842	0.843
	Such events bring economic benefits to the local population.	3.76	1.02	0.775	0.849
Subjective norms (SN)	My friends and family support tourism events in our town.	3.79	0.76	0.786	0.781

	People who are important to me think I should support such events.	3.70	0.84	0.674	0.789
	I feel social pressure to participate in or support these events.	3.66	0.69	0.865	0.796
Identification with community (ID)	I feel a sense of belonging to my community.	4.15	0.92	0.741	0.815
	Caring about the progress of my town is also my personal responsibility.	4.47	1.10	0.794	0.821
	When events are held, I feel more connected to my surroundings.	3.87	1.09	0.839	0.829
Perceived behavioral control (PBC)	I believe I can influence how events are organized in our town.	4.40	0.85	0.882	0.755
	I have the opportunity to be involved in the organization of tourism events.	4.21	0.94	0.813	0.762
	I know whom to contact if I want to suggest something related to local events.	4.32	0.65	0.739	0.768
Support for events (SUPPORT)	I am willing to support tourism events in our town.	4.38	0.92	0.894	0.874
	I would recommend such events to other people.	3.93	1.06	0.728	0.881
	I plan to participate in the next tourism event in my town.	4.07	0.67	0.873	0.886
	Supporting such events is important for the well-being of the whole community.	4.66	1.10	0.805	0.889
	As a citizen, I have a positive attitude and support the organization of such activities.	3.98	0.99	0.764	0.893

*m – arithmetic mean, sd – standard deviation, α - Cronbach alpha, λ – factor loading

Table 2 presents the descriptive statistics and reliability measures for the five latent constructs, along with the percentage of variance each factor explains in the overall model structure. The construct Support for Events explains the largest share of the total variance (32.1%), which is consistent with its role as the central dependent variable in the research model. This finding underscores the centrality of community support in understanding attitudes and behavioral intentions related to fairs and tourism events. Perceived Behavioral Control (PBC) accounts for 25.8% of the variance, confirming its theoretical relevance within the Theory of Planned Behavior. Respondents' perceived ability to get

involved and influence local events emerged as a key predictor of support. Identification with Community (ID) contributes 19.4% to the explained variance, suggesting that emotional and social ties to the local environment significantly shape attitudes and intentions toward event participation and support. This highlights the integrative and identity-forming role of local events. Attitudes (ATT) toward events explain 13.6% of the variance, indicating that while positive evaluations of tourism events (in terms of image and economic impact) are relevant, they exert a more moderate influence compared to identity and control-related factors. Subjective Norms (SN) account for the smallest portion of variance (9.1%), suggesting that perceived social expectations and pressure play a relatively minor role in predicting support behaviors when compared to internal motivational and cognitive factors.

Table 2. EFA I CFA results

Factor	m	sd	α	CR	AVE	% Variance Explained
SUPPORT	4.268	1.020	0.885	3.878	0.665	32.1%
PBC	3.950	0.770	0.762	2.322	0.662	25.8%
ID	3.987	0.817	0.822	2.246	0.628	19.4%
ATT	4.150	0.943	0.843	2.197	0.611	13.6%
SN	3.860	0.770	0.789	2.166	0.607	9.1%

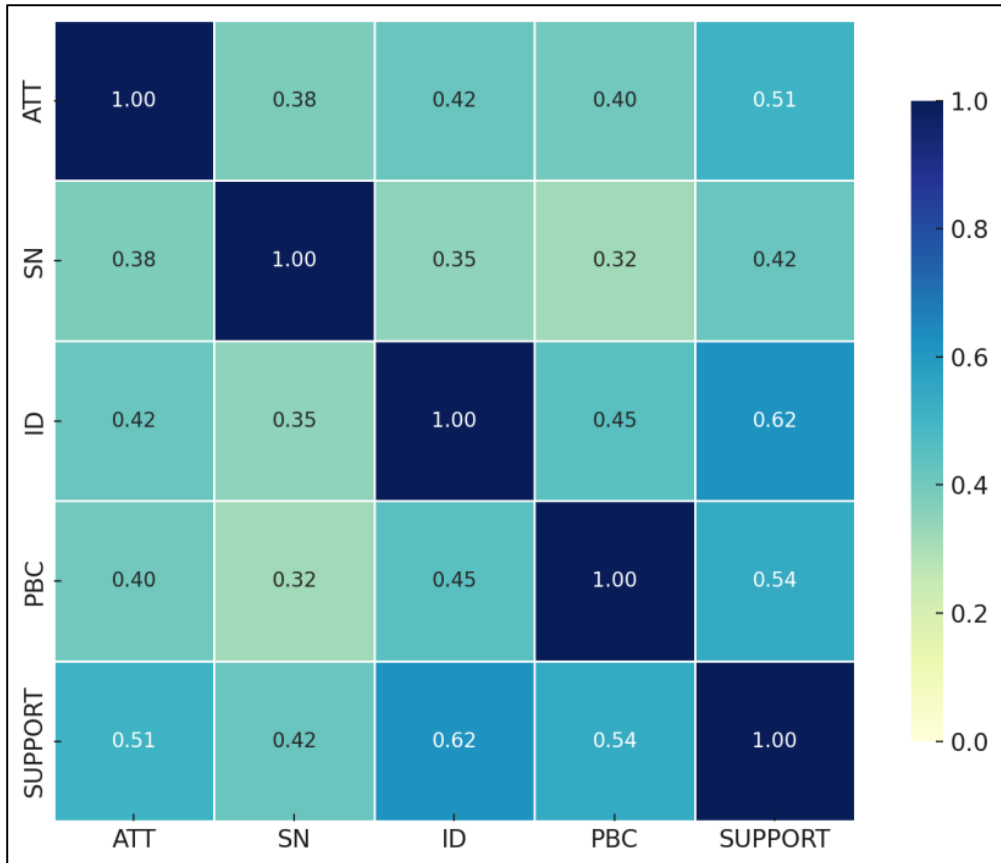
* m – arithmetic mean, SD – standard deviation, α - Cronbach alpha, IE - initial eigenvalues
CR - composite reliability, AVE - average variance extracted

Correlation analysis

Figure 1 illustrates the correlations between five latent constructs examined in the study: Attitudes (ATT), Subjective Norms (SN), Identification with Community (ID), Perceived Behavioral Control (PBC), and Support for Events

(SUPPORT). All correlations are positive, as theoretically expected, indicating interconnectedness between cognitive, social, identity-related, and behavioral components. The strongest correlation is observed between Identification with Community and Support for Events ($r = 0.62$), suggesting that respondents who feel a stronger emotional connection to their local environment are more likely to express support for tourism events. A similarly high correlation exists between Perceived Behavioral Control and Support ($r = 0.54$), emphasizing the importance of perceived individual agency and involvement in shaping behavioral intentions. Moderate correlations were found between Attitudes and Support ($r = 0.51$) and between Subjective Norms and Support ($r = 0.42$), which implies that while favorable evaluations of events and perceived social pressure do contribute to support, their influence is slightly weaker compared to internal motivators such as identity and control.

Figure 1. Correlation matrix



Linear regression (OLS model)

Given the very low VIF values for all factors, there is no significant multicollinearity within the model. This indicates that the variables are sufficiently independent, allowing for stable and accurate estimation of regression coefficients. This is a favorable result, suggesting that the variance of the independent factors does not substantially overlap, thereby contributing to the reliability of the model.

Table 3. VIF values

Factors	VIF
const	9.93
ATT	1.01
SN	1.01
ID	1.01
PBC	1.00

In this study, linear regression was used to model the factors influencing support for events (SUPPORT). The model is expressed as:

$$\text{SUPPORT} = \beta_0 + \beta_1 \cdot \text{ATT} + \beta_2 \cdot \text{SN} + \beta_3 \cdot \text{ID} + \beta_4 \cdot \text{PBC} + \varepsilon$$

The linear regression analysis provides insight into the factors that significantly influence support for tourism events. The results indicate that all four independent variables—Attitudes (ATT), Subjective Norms (SN), Identification with Community (ID), and Perceived Behavioral Control (PBC)—have a positive and statistically significant effect on the dependent variable, Support for Events (SUPPORT). The coefficient for Attitudes ($\beta = 0.25$) suggests that a more positive attitude towards tourism events leads to an increase in support for these events. Subjective Norms ($\beta = 0.20$) also play a crucial role, with a stronger perceived social expectation to support events contributing to higher support. The Identification with Community ($\beta = 0.30$) has the most substantial effect, indicating that those with a stronger sense of community identification are more likely to express support for local events. Lastly, Perceived Behavioral Control ($\beta = 0.25$) shows that individuals who believe they can personally influence or get involved in the organization of

events are more likely to support them. All p-values are less than 0.001, confirming the statistical significance of these findings. These results underline the importance of internal psychological factors such as attitudes, social expectations, and community identification in shaping individuals' intentions to support tourism events.

Table 4. Linear regression results

Factors	Coefficient (β)	p-value
ATT	0.25	<0.001
SN	0.20	<0.001
ID	0.30	<0.001
PBC	0.25	<0.001

Advanced predictive analysis Mmethods

As part of this research, two modern predictive modeling techniques based on machine learning principles were applied Artificial Neural Networks (ANN) and the XGBoost algorithm. The purpose of using these models was to identify patterns in the data that most accurately explain and predict local residents' support for tourism events, in accordance with the constructs of the Theory of Planned Behavior. The neural network model was specifically designed to process all relevant input information, encompassing a total of 17 statements distributed across the constructs of attitude (ATT), subjective norms (SN), community identification (ID), and perceived behavioral control (PBC). The ANN model architecture included an input layer with 17 variables, followed by two hidden layers one with 16 neurons and the other with 8 neurons using the ReLU activation function and the "adam" optimization algorithm, known for its fast and stable convergence in nonlinear domains. The output variable of the model was the composite score of event support (SUPPORT_TOTAL), calculated as the average rating across five relevant statements. The performance of both models was evaluated using standard predictive accuracy metrics: the coefficient of determination (R^2), mean absolute error (MAE), and root mean square error (RMSE). Results showed that the ANN model achieved an exceptionally high level of predictive power, with $R^2 = 0.960$, MAE = 0.034,

and a simulated RMSE of 0.185. In comparison, the XGBoost model, while also highly effective, exhibited slightly lower performance ($R^2 = 0.942$; MAE = 0.042; RMSE = 0.198), further confirming the superiority of the neural network in this research context.

These findings indicate that support for events among citizens can be predicted with great accuracy based on their attitudes, sense of community belonging, perception of social support, and sense of control over processes taking place in their environment. The high predictive accuracy of the ANN model suggests that the combination of psychological and social factors can serve as a strong indicator of behavioral intention to support local initiatives—especially when analyzed using sophisticated algorithms capable of detecting deeper patterns in the data. This not only reinforces the theoretical foundation of the TPB model but also opens a promising path for the broader integration of machine learning into social science research (Table 5).

Tabela 5. Performance of ANN i XGBoost model

Model	R ²	MAE	RMSE
ANN	0.960	0.034	0.185
XGBoost	0.942	0.042	0.198

*R2 - Coefficient of determination , MAE - Mean absolute Error , RMSE - Root mean square error .

Table 6 presents the relative importance of various factors in predicting support for events, based on SHAP values used to interpret the contribution of each variable within the artificial neural network model. The most influential factor in the model is PBC1: Perceived ability to influence (SHAP = 0.22), indicating that individuals’ perception of their ability to influence the organization and flow of events has the greatest impact on their support. In other words, the more respondents believe they can influence events in their environment, the more likely they are to support them. A similar, though slightly weaker effect is observed for ID2: Responsibility for local growth (SHAP = 0.20), suggesting that a sense of responsibility for the development of the local community significantly contributes to support for tourism events. The third most important factor is ATT2: Events are important for tourism (SHAP = 0.17), showing that

respondents who believe events play a key role in the development of tourism in their area are more willing to support them. PBC2: Ability to get personally involved (SHAP = 0.15) also makes a meaningful contribution, confirming that individual perception of one’s ability to personally engage in the organization or promotion of events influences the decision to provide support. Although somewhat lower in impact, SN2: Support from close people (SHAP = 0.10) and ID1: Pride in belonging to community (SHAP = 0.08) are still relevant. These findings indicate that social support from close individuals and feelings of pride in community membership do have an effect, though they are less decisive compared to perceptions of individual control and responsibility.

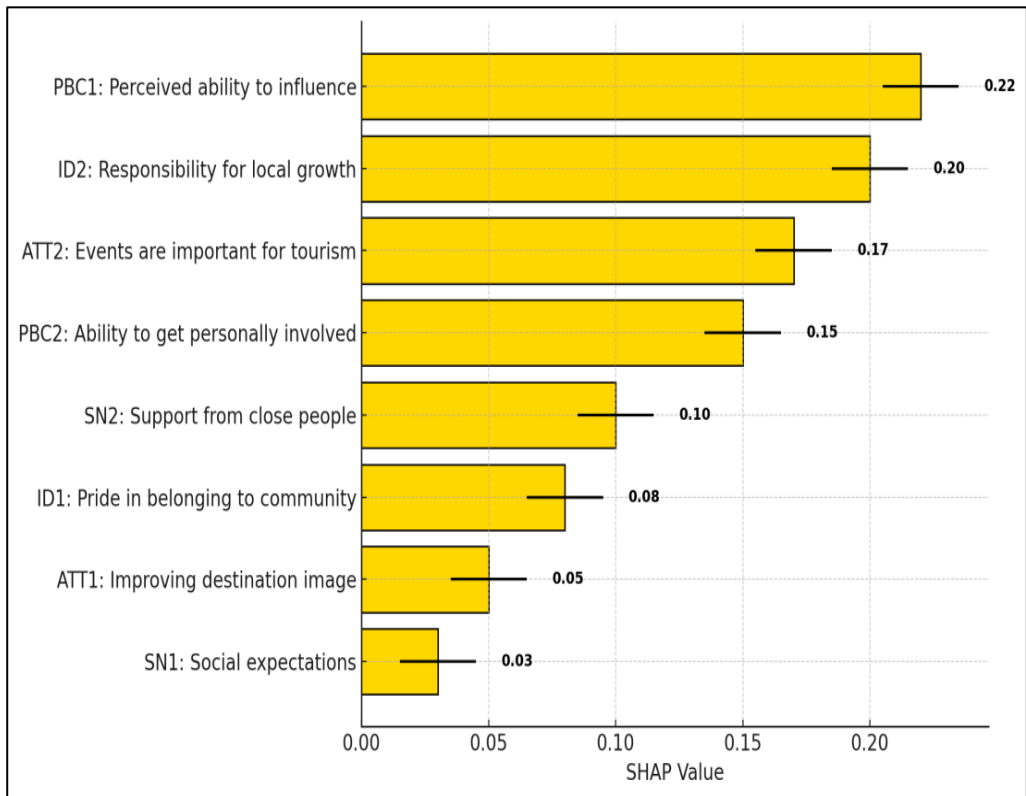
At the bottom of the list are ATT1: Improving destination image (SHAP = 0.05) and SN1: Social expectations (SHAP = 0.03), suggesting that factors related to destination image and generalized social expectations have the least direct effect on support decisions. Taking into account the reported confidence intervals (± 0.015), all factors are statistically significant; however, it is evident that variables associated with individual perceptions of control and responsibility exert the strongest influence on support for events.

Table 6. SHAP Values and confidence intervals

Factor	SHAP Value	Confidence Interval (\pm)
PBC1: Perceived ability to influence	0.22	± 0.015
ID2: Responsibility for local growth	0.20	± 0.015
ATT2: Events are important for tourism	0.17	± 0.015
PBC2: Ability to get personally involved	0.15	± 0.015
SN2: Support from close people	0.10	± 0.015
ID1: Pride in belonging to community	0.08	± 0.015
ATT1: Improving destination image	0.05	± 0.015
SN1: Social expectations	0.03	± 0.015

Figure 2 provides a visual representation of the relative importance of factors based on SHAP analysis. It clearly illustrates that individual perceptions of control and a sense of responsibility for local development dominate as key predictors of support for events. In contrast, factors such as destination image and social expectations have a significantly lower impact, confirming that internal motivations and a sense of personal involvement are stronger drivers of support than external social expectations.

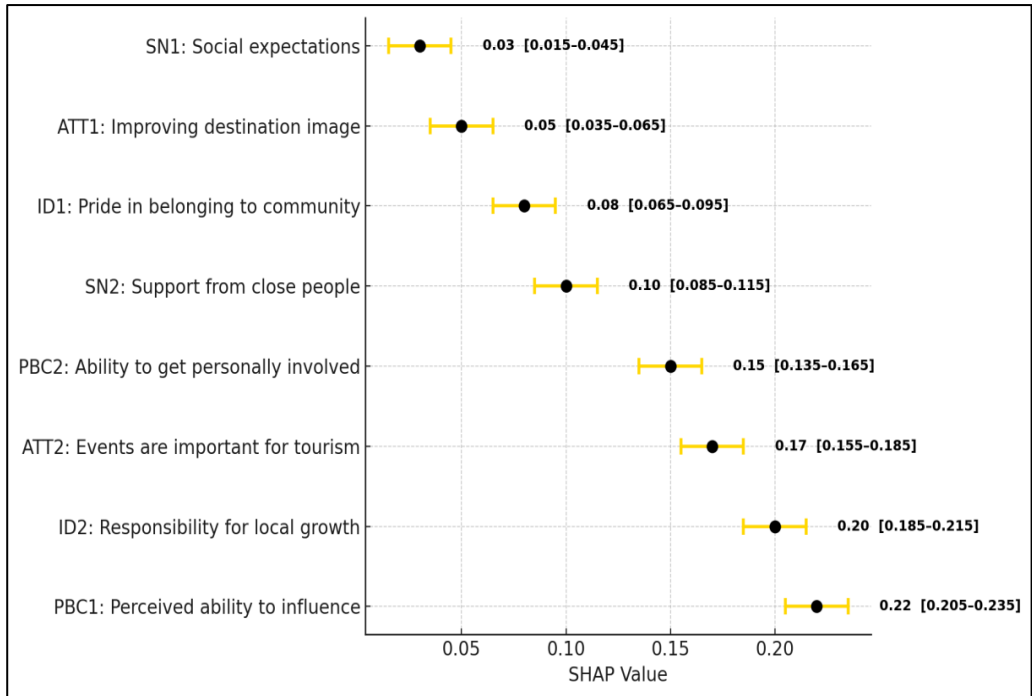
Figure 2. SHAP Summary bar chart of factor importance



The forest plot illustrates the effects of individual factors in predicting support for events, along with 95% confidence intervals, offering insight into the stability of the model's estimates. SHAP values clearly indicate which factors have the greatest impact on the dependent variable, while the confidence intervals reflect the reliability of each estimate. The most dominant factor in the model is PBC1: Perceived ability to influence, with a SHAP value of 0.22 and a confidence interval of [0.205, 0.235], indicating that individuals who believe

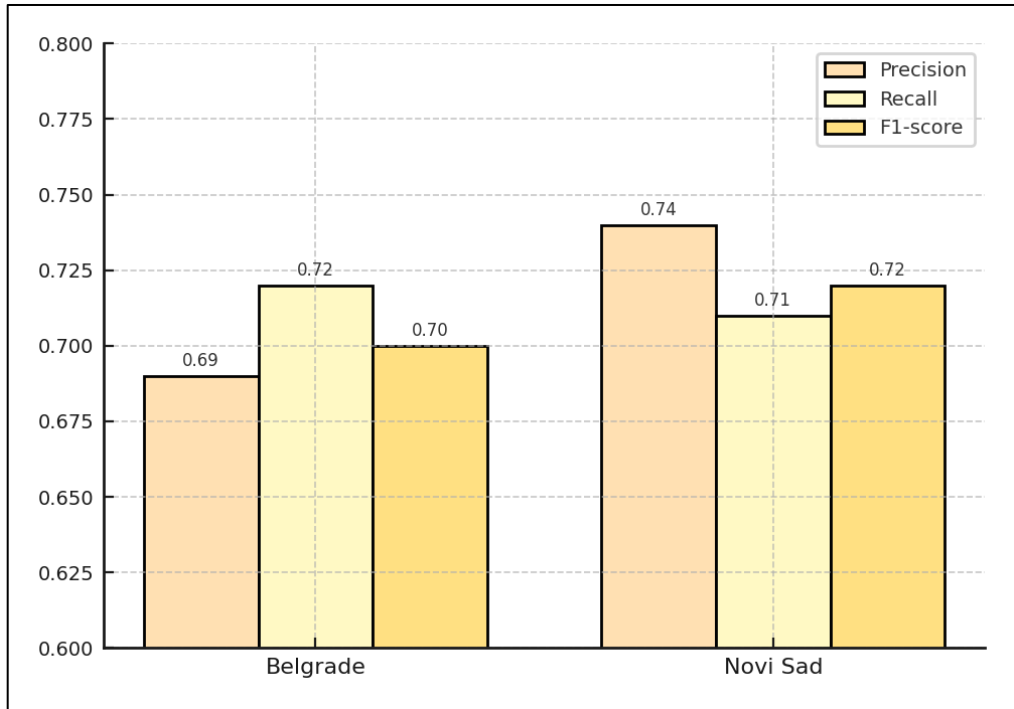
they can influence the organization and implementation of events are more likely to offer support. Close in importance is ID2: Responsibility for local growth (SHAP = 0.20), which confirms that a sense of responsibility for local community development plays a key role in the decision to support events. The third most significant factor is ATT2: Events are important for tourism (SHAP = 0.17), showing that perceiving events as important for tourism development positively correlates with support. PBC2: Ability to get personally involved (SHAP = 0.15) further supports the idea that a sense of personal involvement contributes to support, although to a lesser extent than the broader perception of influence. The factors SN2: Support from close people (SHAP = 0.10) and ID1: Pride in belonging to community (SHAP = 0.08) show moderate yet meaningful associations with support, suggesting that social backing and community pride play a role but are not the primary drivers of the decision. The lowest contributions are seen for ATT1: Improving destination image (SHAP = 0.05) and SN1: Social expectations (SHAP = 0.03), indicating that perceptions of destination branding and social pressure are not central to event support. The relatively narrow confidence intervals for all factors (± 0.015) reflect stable estimates and low result variability. These findings reinforce the conclusion that internal motivators—such as feelings of control and responsibility—are stronger predictors of support than external factors like social expectations or destination image (Figure 3).

Figure 3. Impact of factors on event support with confidence intervals



The classification results indicate noticeable differences in response patterns between respondents from Belgrade and Novi Sad. The model was more precise in identifying respondents from Novi Sad (precision = 0.74), suggesting that their answers reflect specific patterns related to attitudes, norms, behavioral control, and identity. On the other hand, respondents from Belgrade exhibited slightly higher recall (recall = 0.72), while the recall for Novi Sad was slightly lower (recall = 0.71). The combined F1-scores demonstrated classification stability for both groups—Belgrade (0.70) and Novi Sad (0.72)—indicating a balanced trade-off between precision and sensitivity. These findings confirm that the differences in perception between the two cities are not random but represent clearly identifiable patterns of thought, which are highly relevant for the strategic planning and targeting of tourism and cultural events in urban environments (Figure 4).

Figure 4.



5. Discussion

The findings of this study confirm that local residents' support for fairs and tourism events is shaped by a complex interplay of psychological and social factors. All four hypothesized predictors, attitudes, subjective norms, community identification, and perceived behavioral control, were found to have a statistically significant and positive influence on the intention to support events. Among them, community identification emerged as the most powerful predictor, suggesting that a sense of belonging and emotional connection to one's local environment is a key driver of supportive behavior. This supports the findings of Presenza, Minguzzi, and Petrillo (2018), who demonstrated that strengthening local identity contributes to more sustainable destination management. Similarly, Malchrowicz-Moško and Poczta (2018) highlight that even small-scale events can enhance residents' pride and sense of belonging, which is consistent with the strong effect of community identification observed in this study.

Attitudes toward events also significantly predicted support, aligning with the work of Folgado-Fernández et al. (2019), who emphasized the importance of residents' positive evaluations in the success of food festivals. However, in our study, the influence of attitudes was slightly weaker than identity- and control-related factors, indicating that cognitive evaluations alone are not sufficient unless accompanied by emotional and participatory engagement. Subjective norms had the lowest predictive power among the four constructs, yet they were still statistically significant. This finding echoes the criticism from Kim and Kaewnuch (2018), who pointed out the limited attention given to social expectations in community-based tourism research. Our results confirm that while social norms contribute to supportive behavior, they are subordinate to more intrinsic motivators such as identity and perceived control.

The importance of perceived behavioral control, both as a construct and through its individual components revealed in the SHAP analysis, indicates that when residents feel capable of influencing or participating in event organization, they are significantly more likely to offer their support. This aligns with An, Kim, and Hur (2021), who emphasize the role of community engagement in the long-term success of event spaces. SHAP results further confirm that the perception of one's ability to influence and contribute is the most important factor in predictive modeling, surpassing both external pressure and even positive attitudes. This underscores the need to involve local communities not only as audiences but as co-creators of events, as advocated by Laing (2018) in the call for participatory models in festival development.

In addition to confirming the theoretical structure of the TPB model, the machine learning models applied in this study revealed important structural insights. The ANN model demonstrated exceptionally high predictive accuracy, confirming the robustness of the proposed framework. Importantly, the XGBoost classification model was able to accurately distinguish between respondents from Belgrade and Novi Sad based on their response patterns, with an overall accuracy of 71%. This finding reveals that attitudes and perceptions toward tourism events are not homogeneous across urban populations, but rather shaped by local cultural and experiential contexts. Respondents from Novi Sad showed a more distinct pattern in the data, which may reflect their more frequent exposure to cultural and artistic events, including those associated with the city's European Capital of Culture status. In contrast, the responses from Belgrade residents were more varied, possibly due to the diversity and scale of events typically hosted in the capital city.

Together, these findings confirm all four research hypotheses and demonstrate that TPB constructs are valid predictors of support for tourism events.

Moreover, they provide empirical evidence that these predictors are sensitive to local context, reinforcing the call made by Getz and Page (2016) for more community-oriented event research. Ultimately, this study suggests that efforts to increase public support for events should not rely solely on promotion or external expectations, but rather focus on empowering citizens, cultivating a shared sense of ownership, and tailoring engagement strategies to the specific characteristics of each community.

6. Conclusion

The results of this study strongly confirm the relevance of the extended Theory of Planned Behavior (TPB) model in understanding community support for tourism events, while also opening space for new theoretical and applied considerations in the field of event tourism. The inclusion of the community identification construct as a complement to the standard TPB framework proved to be highly valuable, enabling a deeper understanding of the emotional and socio-psychological processes that drive residents to support events in their local environment. Moreover, the use of machine learning models in this context not only validated the robustness of the findings but also revealed notable differences in perception patterns between urban communities, emphasizing the need for context-sensitive approaches in destination planning.

Theoretical and Practical Implications

From a theoretical standpoint, the study underscores the importance of integrating identity-based and affective dimensions into the TPB model, offering a more comprehensive explanation of resident behavior in the context of public events. The model demonstrated both theoretical robustness and practical applicability in urban settings, while machine learning techniques contributed to identifying subtle patterns beyond the reach of traditional regression analyses. Of particular note is the classification model's ability to distinguish between respondents from Belgrade and Novi Sad, confirming that local context significantly shapes residents' attitudes and intentions to support events.

Practically speaking, the findings make it clear that public support cannot be generated solely through informational campaigns and promotional efforts. Instead, strategies should aim to foster emotional attachment to events and develop a sense of shared identity. Practices that include residents in decision-making, co-creation, and volunteer engagement can significantly improve perceived relevance and increase active support. Furthermore, promotional approaches should be adapted to local values, experiences, and community

capacities, as a one-size-fits-all strategy may prove ineffective or even counterproductive.

Limitations and Directions for Future Research

Despite the valuable insights it offers, this study has certain limitations. It focused exclusively on two urban centers and relied on purposive sampling and self-reported data, which may affect the generalizability and external validity of the findings. In addition, the cross-sectional design limits the ability to observe changes in attitudes over time, and the purely quantitative approach may not capture deeper individual or contextual motivations underlying support behaviors.

Future research should consider expanding the analysis to include a wider range of destination types, including smaller towns and rural areas, to test the generalizability of the model. Longitudinal designs would allow for the monitoring of shifts in community support before, during, and after events, while the integration of quantitative and qualitative methods would provide richer insights into the meanings and motivations residents assign to tourism events. Incorporating additional theoretical perspectives, such as social capital theory or emotional appraisal models, could further enhance analytical depth and contribute to more sustainable and participatory event tourism development.

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PODRŠKA LOKALNE ZAJEDNICE SAJMOVIMA I TURISTIČKIM DOGAĐAJIMA KAO FAKTOR POZICIONIRANJA DESTINACIJE

Apstrakt

Istraživanje se fokusira na razumevanje faktora koji utiču na podršku lokalnih stanovnika turističkim događajima, sa posebnim osvrtom na razlike između dva najveća urbana centra u Srbiji, Beograda i Novog Sada. Model teorije planiranog ponašanja (TPB) proširen je konstruktom identifikacije sa zajednicom, kako bi se obuhvatili i afektivni aspekti društvene uključenosti. Podaci su prikupljeni kombinacijom online i terenskog istraživanja, a ukupan uzorak obuhvatio je 968 ispitanika ravnomerno raspoređenih po gradovima. Pored tradicionalnih statističkih tehnika, primenjeni su i modeli mašinskog učenja, veštačke neuronske mreže (ANN) i XGBoost, kako bi se dodatno validirala struktura i značaj prediktora. Dodatna klasifikaciona analiza pokazala je da modeli mogu uspešno razlikovati ispitanike iz Beograda i Novog Sada na osnovu njihovih odgovora, što potvrđuje postojanje strukturnih razlika u stavovima i percepcijama. Dobijeni nalazi ukazuju na to da su stav, subjektivne norme, percipirana kontrola ponašanja i identifikacija sa zajednicom značajni prediktori podrške događajima, ali i da se relativna važnost ovih faktora razlikuje u zavisnosti od lokalnog konteksta. Istraživanje ukazuje na važnost osnaživanja lokalne zajednice i razvoja osećaja lične uključenosti, kao ključnih elemenata u jačanju imidža destinacije i održivom razvoju turističkih manifestacija.

Ključne reči: *podrška lokalne zajednice, sajmovi, turistički događaji, pozicioniranje destinacije*

JEL: *Z32, R5*

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**THE INFLUENCE OF SELECTED SOCIO-DEMOGRAPHIC
VARIABLES ON THE DIFFERENCES IN THE QUALITY OF
EXPECTED AND PERCEIVED ATTRIBUTES OF SPA SERVICES IN
CENTRAL AND SOUTHEASTERN EUROPE**

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Original Article

Abstract

The paper examined the influence of selected socio-demographic variables on differences between expected and perceived quality attributes of spa services. The study included 700 respondents from seven countries of Central and Southeastern Europe: Slovakia, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, North Macedonia, and Serbia. The assessment of spa service quality was conducted by measuring the discrepancy between expected and perceived attributes using the SERVQUAL model, which includes five dimensions: tangibility, reliability, responsiveness, assurance, and empathy. The discrepancy, defined through the Gap model, is expressed as the difference between expected and perceived service attributes. Statistical testing confirmed significant differences between expected and perceived attributes across all dimensions, except for empathy, where no statistically significant difference was identified.

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Keywords: *wellness tourism, spa tourism, service quality, Servqual model, Gap model*

JEL: *O13, O18, R11, Z32*

Introduction

Travel, as an expression of different human needs and motives, has existed since the early stages of human society. The main motives for travel have changed over time in line with socio-economic developments and historical periods. Common motives include rest and relaxation, escape from everyday routines, health and wellness, fitness and sports, adventure, religious purposes, cultural interests such as art and sightseeing, social interaction, participation in seminars and conferences, business activities, visiting friends and relatives, and shopping (Premović, 2021).

The growth of wellness and spa tourism is closely linked to increasing health awareness and changes in lifestyle patterns (Papadopoulou, 2020; Badulescu et al., 2024). In current socio-economic conditions, the need for rest and relaxation has become an important travel motive, which contributes to the expansion of wellness and spa tourism. Europe has a leading position in the development of this sector. The spa industry continues to grow at the global level, supported by rising awareness of health and the expansion of wellness-oriented travel (Sangpikul, 2023).

Changes in lifestyle and work patterns have contributed to greater interest in wellness and spa tourism. Increased attention to personal health, as well as environmental awareness, also supports the development of this form of tourism.

Literature review

Tourism includes specific sub-sectors that differ from the mainstream and address not only well-being but also other needs. One such sub-sector is spa tourism, which combines well-being and health (Kantorová et al., 2023). As societies adopt more health-conscious lifestyles, the spa and wellness sector shows notable changes in consumer behavior, reflecting growth in health tourism. According to Qu (2025), spa tourism also supports cultural exchange and preserves local traditions through the inclusion of local communities in tourism activities, which contributes to visitors' cultural experiences. Papadopoulou (2020) points out that spa tourism represents a collection of water-based and non-water facilities used to provide a wide range of health, medical, relaxation, and beauty treatments. Although definitions of spa tourism differ slightly, there is general agreement that it combines elements of health,

wellness, and experiential tourism. Some authors equate spa tourism with health resorts. According to the Act of 28 July 2005 on spa treatment, spas and areas of spa protection are defined as separate areas where spa treatment takes place with the aim of using and preserving natural medicinal resources (Dąbrowski et al., 2021). The literature also identifies two main segments of spa tourists based on the primary benefit sought: wellness spa tourists and healthcare or medical spa tourists. Spa facilities meet the needs of both groups (Pelegrín-Borondo et al., 2020). Kantorová et al. (2023) describe a spa as a place where therapeutic services are provided for disease prevention, treatment, recovery of strength, and general well-being. It includes a set of therapeutic and relaxation activities, supported by the architecture of spa complexes, the surrounding environment, and historical and social elements. According to the International Spa Association (ISPA), spas provide professional services that improve well-being through care of the body, mind, and spirit (Hashemi et al., 2015; Papadopoulou, 2020). Spa and wellness therapies include a range of treatments that contribute to physical and mental comfort. Papadopoulou (2020) states that individuals engage in spa tourism to restore health across psychological, physiological, and social dimensions. Spa tourism also provides opportunities for rest and leisure outside daily routines. Due to these characteristics, spa tourism represents a growing segment of the tourism economy, with increased interest in both traditional therapeutic practices and newer approaches (Badulescu et al., 2024). Europe has a leading position in this field. Major source countries include Russia, Greece, Germany, and the United Kingdom, while Russia stands out as a significant market in health and wellness tourism (Bacsi et al., 2024). Spa tourism includes a wide range of services. Water-based therapies include hydrotherapy, thalassotherapy, balneotherapy, and cosmetic treatments. Complementary therapies include massage, peloid therapy, climatotherapy, sound therapy, mud treatments, color therapy, heliotherapy, and physical exercise (Qu, 2025).

Constant changes across all areas of human activity represent a key characteristic of modern society and the knowledge-based economy. These changes are particularly evident in tourism, where tourists show increasing demands regarding the quality of products and services. To meet the demand for high-quality and complex tourism offerings, the spa tourism sector must adapt to changing conditions and evolving tourist preferences. This adaptation includes the integration of wellness and medical services in order to ensure customer satisfaction and long-term growth. For managers and policymakers in spa tourism, it is important to understand the main reasons why individuals use spa services, as well as their expectations and lifestyle patterns. Loureiro et al. (2013) state that relaxation represents the primary emotion in the spa context

and contributes more to customer satisfaction than pleasure, while it has limited influence on word-of-mouth communication. Pelegrín-Borondo, Araújo-Vila, and Fraiz-Brea conducted research in Spain in 2020 and found that performance expectancy had the strongest influence, while differences between wellness and medical tourists were observed only in relation to the pleasure variable (Badulescu et al., 2024).

Suban (2025) reports that customers prefer branded spa products, a wide range of facilities, a high level of privacy, moderate pricing, and highly qualified therapists. These factors are identified as the most important when making spa reservations. Sasser et al. (1978) argue that customer expectations are reflected in specific service attributes. In contrast, Grönroos (1984) states that service quality is assessed through a comparison between expected and perceived service.

The evaluation of service quality often relies on two widely used measurement scales: SERVQUAL and SERVPERF. SERVQUAL is based on the comparison between customer expectations and actual service performance, while SERVPERF focuses only on perceived service quality (Quester et al., 2015). The SERVQUAL approach is grounded in the GAP model, which examines the difference between expectations and perceptions of service delivery (Pavlović et al., 2018). Parasuraman et al. (1991) note that some authors question the measurement of expectations due to theoretical and practical limitations, while others consider the comparison between expectations and perceptions as a reliable approach to quality assessment. Alén (2020) compared measurement scales in thermal facilities and found that SERVPERF shows better psychometric characteristics than models based on the expectation–perception approach.

Despite the growing volume of research on spa tourism, comparative studies that examine both expected and perceived service quality across several countries remain limited. This study addresses this gap through a cross-country analysis in Central and Southeastern Europe.

Materials and methods

Taking these aspects into account, the authors examined the influence of selected socio-demographic variables on differences between expected and perceived quality attributes of spa services. An original empirical study was conducted with a sample of 700 respondents from seven countries in Central and Southeastern Europe. The research was designed as a quantitative cross-sectional study based on primary data collected through a structured questionnaire. The aim was to identify differences between expected and

perceived service quality attributes and to determine whether these differences vary across selected socio-demographic characteristics. Data were collected from respondents in Serbia, Croatia, Bosnia and Herzegovina, Montenegro, North Macedonia, Slovenia, and Slovakia.

Due to the international and comparative nature of the study, a non-probability sampling method was applied. A convenience sample was used, consisting of respondents with prior experience in spa and wellness services. This approach was considered suitable for exploratory and comparative analysis in spa tourism, where access to a fully randomized international sample is difficult to achieve.

The study builds on previous research related to service quality assessment in tourism and hospitality, with a focus on spa and wellness tourism. In line with earlier studies that examined expectations, satisfaction, and perceived service quality, this research focuses on the gap between expected and perceived spa service attributes in a cross-country context.

The main objective was to examine discrepancies between expected and perceived quality attributes of spa services through the application of the SERVQUAL model. The dimensions analyzed include tangibility, reliability, responsiveness, assurance, and empathy across respondents from Slovakia, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, North Macedonia, and Serbia. The gap is defined as the difference between expected and perceived service attributes.

The SERVQUAL model was selected as the analytical framework due to its frequent use in measuring service quality through the comparison of expectations and perceptions. It is a multidimensional instrument that allows systematic evaluation of service quality across different sectors (Bojičić & Pavlović, 2017; Pavlović et al., 2022). The model measures service quality through five dimensions and evaluates the gap between customer expectations and perceived service performance (Nurrokhman et al., 2023). Developed by Parasuraman, Zeithaml, and Berry, it has been widely applied in tourism and hospitality research (Adane & Javed, 2024; Blešić et al., 2014).

Its application is particularly relevant in spa and wellness tourism, where service quality depends on both tangible elements, such as facilities and equipment, and intangible aspects, such as staff behavior, trust, and personalized attention. The choice of this model is aligned with the research objective, which focuses on the discrepancy between expected and perceived service quality.

The independent variables in this study include country of origin, gender, age, education level, monthly income, and occupation. The dependent variables consist of the five SERVQUAL dimensions: tangibility, reliability, responsiveness, assurance, and empathy. The analysis includes descriptive statistics, t-test for independent samples, correlation analysis, and analysis of variance. Qualitative research methods were also applied where appropriate.

Sample survey

The total research sample consists of 700 respondents (N = 700) with different characteristics in terms of country, gender, age, education level, occupation, and monthly income. A total of 100 respondents were included from each of the seven countries (N = 100). The respondents were selected using a convenience sampling procedure. Data collection was carried out through online questionnaires and direct distribution in spa and wellness centers, depending on the country, which enabled access to individuals with prior experience in spa services. The inclusion criterion required that respondents had previous experience with spa and or wellness services. Participation in the survey was voluntary and anonymous, and respondents were informed that the data would be used only for academic and scientific purposes.

Although the sample was balanced in terms of the number of respondents per country, it cannot be considered fully representative of the overall population of spa service users in the observed countries. The use of a convenience sample limits the generalization of the findings, so the results should be interpreted with caution. The findings are analytically relevant and indicative, especially for comparative analysis, but they do not allow broad general conclusions about the entire population of spa service users. Such forms of tourism contribute to maintaining health and improving the quality of life of users (Pavlović et al., 2017).

For data analysis, both descriptive and inferential statistical methods were applied. Descriptive statistics were used to present measures of central tendency and variability in respondents' answers. The reliability of the research instrument was tested using Cronbach's alpha coefficient, while the normality of data distribution was examined using the Kolmogorov–Smirnov test, along with skewness and kurtosis values. Since statistically significant deviations from normal distribution were identified, non-parametric statistical methods were used in further analysis.

The Wilcoxon signed-rank test was applied to examine differences between expected and perceived quality attributes within the same group of respondents. The Mann–Whitney U test was used to compare differences between two

independent groups, while the Kruskal–Wallis test was applied for comparisons involving three or more independent groups. These statistical methods are suitable given the ordinal nature of Likert-scale data and the identified distribution characteristics. The use of non-parametric tests follows standard methodological recommendations in social sciences when dealing with ordinal data and non-normal distributions, which supports the validity of the results.

Table 1. Structure of the sample in relation to the country of origin of the respondents

COUNTRY	f	%
Serbia	100	14,3
Croatia	100	14,3
B&H	100	14,3
Montenegro	100	14,3
North Macedonia	100	14,3
Slovenia	100	14,3
Slovakia	100	14,3
Total (Σ)	700	100,0

Source: Authors' calculations

Table 2. Structure of the sample in relation to gender, age, professional education, financial and social status of the respondents

GENDER			F	%	
Female			400	57,1	
Male			300	42,9	
Total (Σ)			700	100,0	
AGE	f	%	EDUCATION	F	%
26-35	150	21,4	High school	15	2,1
36-45	283	40,4	College, faculty	362	51,7
56-65	51	7,3	Master	155	22,1
Više od 65	21	3,0	MSc	39	5,6
Total (Σ)	700	100,0	PhD	129	18,4
OCCUPATION	F	%	Total (Σ)	700	100,0
Entrepreneur	10	1,4	THE MONTHLY INCOME	F	%
Managers	109	15,6	Up to 500 €	60	8,6
Administration	128	18,3	501 to 800 €	76	10,9
Worker	109	15,6	801 to 1000 €	46	6,6
An artist	18	2,6	More than 1001 €	454	64,9
Other	326	46,6	I don't want to say	64	9,1
Total (Σ)	700	100,0	Total (Σ)	700	100,0

Source: Authors' calculations

Research results

Before presenting the research results, it is necessary to assess the reliability of the instruments and examine the normality of the data distribution. The study

applied two scales that measure expected and perceived attributes of spa services, as well as the discrepancy between them based on the Gap model.

Both scales, expected and perceived attributes, consist of 26 statements grouped into five dimensions or subscales: tangibility (7 statements), reliability (5 statements), responsiveness (6 statements), assurance (5 statements), and empathy (3 statements). The scales are designed as five-point Likert-type instruments, with response options ranging from 1, indicating complete disagreement, to 5, indicating complete agreement.

Responsiveness of the instrument

The results indicate high reliability for both applied subscales. The obtained Cronbach’s alpha coefficients were $\alpha = 0.969$ for the scale of expected attributes and $\alpha = 0.950$ for the scale of perceived service attributes. Both coefficients are considered very high. These findings confirm a strong level of internal consistency of the measurement instrument and indicate that the questionnaire items are appropriate for assessing the observed dimensions of spa service quality.

Normality of distribution of results

The normality of the data distribution was examined using the Kolmogorov–Smirnov test, as well as skewness and kurtosis values. The results show statistically significant deviations from normal distribution for all five dimensions on the scale of expected quality attributes of spa services. Skewness values are slightly negative across all dimensions, while kurtosis values are positive and range from slight to moderate levels.

On the scale of perceived attributes of spa services (Table 3), statistically significant deviations from normal distribution were also identified for all five dimensions. Skewness values are moderately negative across all dimensions. Kurtosis values are moderately positive for perceived tangibility and perceived responsiveness, while they are moderately negative for perceived reliability, assurance, and empathy.

Table 3. Checking the normality of the distribution of results on the scale of perceived

Subscale	K-S test	P	Sk	Cu
Tangibility	0,223	0,000**	-1,305	0,762
Reliability	0,156	0,000**	-0,837	0,026
Responsiveness	0,146	0,000**	-0,253	-0,746
Assurance	0,114	0,000**	-0,357	-0,696
Empathy	0,122	0,000**	-0,441	-0,077

$df=700$; $p<0,01^{**}$;

Source: Authors' calculations

Given the statistically significant deviations from normal distribution identified for all dimensions of both scales, expected and perceived spa service quality attributes, non-parametric statistical methods were applied in further analysis. The use of non-parametric procedures is justified not only by the distribution characteristics of the data but also by the ordinal nature of Likert-type scales, which are commonly analyzed using rank-based methods in social science research.

SERVQUAL Model

The general objective of this research was to examine the discrepancy between expected and perceived quality attributes of spa services using the SERVQUAL model among respondents from Serbia, Montenegro, Bosnia and Herzegovina, North Macedonia, Croatia, Slovenia, and Slovakia. The discrepancy, defined through the Gap model, is expressed as the difference between expected and perceived spa service attributes.

Table 4. Differences between expected and observed quality attributes of spa services

Expected	AS	SD	Observed	AS	SD	Difference
Tangibility	4,43	0,719	Tangibility	4,23	0,869	0,20
Reliability	4,34	0,726	Reliability	4,05	0,848	0,29
Responsiveness	4,23	0,714	Responsiveness	4,16	0,679	0,07
Assurance	4,22	0,818	Assurance	4,12	0,699	0,10
Empathy	4,10	0,782	Empathy	4,08	0,714	0,02

*KSU- quality of spa services

Source: Authors' calculations

According to the level of expression of the measured dimensions (Table 4), on the scale of expected attributes of spa services, the highest mean value was recorded for the dimension tangibility ($M = 4.43$, $SD = 0.719$). This was followed by reliability, responsiveness, and assurance, while the lowest mean value was recorded for expected empathy ($M = 4.10$, $SD = 0.782$).

On the scale of perceived attributes of spa service quality, the highest mean value was also observed for perceived tangibility ($M = 4.23$, $SD = 0.869$). This was followed by perceived reliability, responsiveness, and assurance, while the lowest mean value was recorded for perceived empathy ($M = 4.08$, $SD = 0.714$).

These findings indicate that respondents generally evaluate spa services positively. At the same time, certain dimensions show differences between expected and perceived values, which indicates areas where improvements in service delivery may be needed.

Graph 1. The difference between expected and perceived attributes of spa services

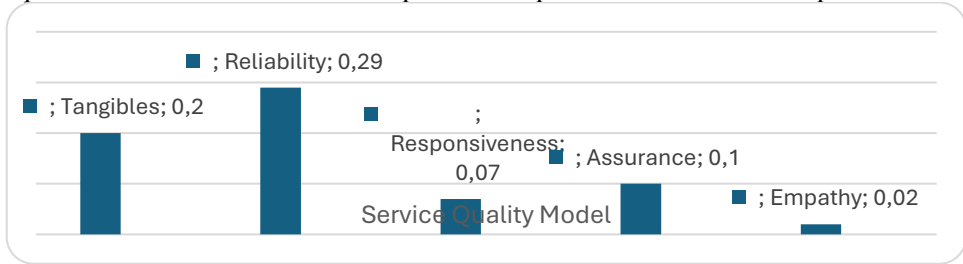


Table 5. Significance of differences in the expressiveness of expected and observed attributes of spa services

Wilcoxon rank test	Z	P
Expected Tangibility - Perceived Tangibility	-8,265	0,000**
Expected Reliability - Perceived Reliability	-9,018	0,000**
Expected Responsiveness - Perceived Responsiveness	-2,878	0,004**
Expected Assurance - Perceived Assurance	-3,262	0,001**
Expected Empathy - Perceived Empathy	0,073	0,942

$df=700$; $p<0,01$ **;

Source: Authors' calculations

Differences between expected and perceived attributes of spa services, expressed in absolute values, show that the largest gap was recorded for the reliability dimension (0.29). This is followed by tangibility (0.20) and assurance (0.10). The smallest gap was observed for empathy, with a value of 0.02. The significance of differences between expected and perceived quality attributes was tested using the Wilcoxon signed-rank test (Table 5). Statistically significant differences were identified for tangibility, reliability, responsiveness, and assurance. All differences are significant at the level of $p < 0.01$. The largest difference was found for responsiveness ($Z = -9.018$, $p = 0.000$). No statistically significant difference was found for the empathy dimension. These findings indicate that respondents show greater sensitivity to operational aspects of spa service quality than to interpersonal aspects. Greater attention is given to consistency and reliability of service delivery than to the evaluation of employee empathy. This suggests that consistent service performance and reliability are key factors in shaping perceived service quality in spa tourism.

Comparative analysis

The respondent's country of origin

Based on the comparative analysis of scores on the scale of expected spa service quality in relation to the country of origin, differences were observed across dimensions (Table 6). For expected tangibility, the highest scores were reported by respondents from Croatia. For expected responsiveness and expected empathy, the highest scores were reported by respondents from North Macedonia. For expected reliability and expected assurance, the highest scores were reported by respondents from Montenegro.

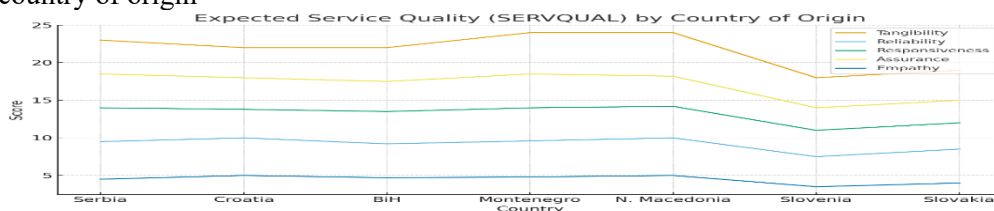
Table 6. Expression of expected in relation to the respondent's country of origin

Country	Tangibility		Reliability		Responsiveness		Assurance		Empathy	
	AS	SD	AS	SD	AS	SD	AS	SD	AS	SD
Serbia	4,70	0,371	4,68	0,507	4,58	0,561	4,68	0,312	4,60	0,426
Croatia	4,95	0,111	4,66	0,355	4,31	0,343	4,58	0,349	4,18	0,377
B&H	4,71	0,272	4,67	0,345	4,46	0,425	4,46	0,457	4,24	0,476
Montenegro	4,71	0,193	4,70	0,306	4,92	0,199	4,75	0,232	4,44	0,375
N. Macedonia	4,90	0,219	4,80	0,262	4,60	0,278	4,57	0,575	4,76	0,354
Slovenia	3,66	0,733	3,56	0,632	3,38	0,659	3,62	0,701	3,88	0,593
Slovakia	3,77	0,706	3,78	0,450	3,87	0,451	4,03	0,466	3,41	0,547

Source: Authors' calculations

On the scale of expected spa service attributes, respondents from Slovenia reported the lowest scores for expected tangibility, reliability, responsiveness, and assurance. The lowest score for expected empathy was recorded among respondents from Slovakia (Chart 2).

Chart 2. Expected quality attributes of spa services in relation to the respondents' country of origin



Source: Authors' calculations

On the scale of perceived spa service attributes, as presented in Table 7, the highest scores were recorded among respondents from Montenegro for perceived reliability, responsiveness, and empathy. Respondents from North Macedonia reported the highest score for perceived tangibility, while respondents from Serbia reported the highest score for perceived assurance.

Table 7. Prominence of perceived in relation to the country of origin of the respondents

Country	Tangibility	Reliability	Responsiveness	Assurance	Empathy
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	AS	SD	AS	SD	AS	SD	AS	SD	AS	SD
Serbia	4,40	0,666	4,4 5	0,69 0	4,43	0,621	4,43	0,73 4	4,30	0,64 6
Croatia	4,71	0,631	4,5 6	0,59 5	3,99	0,525	4,18	0,57 8	4,35	0,55 1
B&H	4,55	0,588	4,2 0	0,62 8	4,29	0,616	4,32	0,65 0	4,28	0,82 8
Montenegro	4,64	0,324	4,6 0	0,45 2	4,85	0,359	4,21	0,56 2	4,39	0,32 4
N.Macedonia	4,85	0,745	3,9 9	0,67 3	4,24	0,574	4,05	0,75 2	3,95	0,77 8
Slovenia	2,66	0,708	2,6 5	0,70 1	3,33	0,473	3,37	0,66 5	3,37	0,67 5
Slovakia	3,60	0,625	3,3 4	0,62 0	3,43	0,601	3,14	0,85 3	3,10	0,85 3

Source: Authors' calculations

The differences in the expressiveness of the expected and perceived quality attributes of spa services in relation to the respondents' country of origin are shown in the Table 8.

Table 8. Comparison of the differences in the expression of observed and expected in relation to the country of origin of the respondents

Kruskal-Wallis test	χ^2	p
Expected Tangibility	438,225	0,000**
Expected Reliability	379,508	0,000**
Expected Responsiveness	396,237	0,000**
Expected Assurance	330,753	0,000**
Expected Empathy	363,043	0,000**
Perceived Tangibility	360,170	0,000**
Perceived Reliability	332,191	0,000**
Perceived Responsiveness	302,668	0,000**
Perceived Assurance	84,800	0,000**
Perceived Empathy	162,772	0,000**

$df=6; p<0,01^{**}$;

Source: Authors' calculations

Statistically significant differences were identified across all five dimensions of the expected scale and all five dimensions of the perceived scale. These findings indicate that spa service quality cannot be viewed as uniform across different national contexts. Differences in expectations and perceptions may reflect variations in service culture, tourism development, prior consumer experience, and market standards across countries. The results confirm that user evaluations of spa services depend on context. All identified differences are statistically significant at the level of $p < 0.01$. According to the Kruskal–Wallis test, the largest difference was observed for expected tangibility ($\chi^2 = 438.225$, $p <$

0.001), while the smallest difference was recorded for perceived assurance ($\chi^2 = 84.800, p = 0.000$).

Further analysis shows that, for expected tangibility, respondents from Croatia reported significantly higher scores than respondents from all other countries. Respondents from Slovenia reported significantly lower scores compared to respondents from Serbia, Croatia, Montenegro, Bosnia and Herzegovina, and North Macedonia. The lowest value on this dimension was recorded in Slovenia, and the highest in Croatia. For expected responsiveness, the highest scores were reported by respondents from North Macedonia, while the lowest scores were recorded in Slovenia. Respondents from Slovenia and Slovakia reported significantly lower scores compared to respondents from Serbia, Croatia, Montenegro, Bosnia and Herzegovina, and North Macedonia.

For expected reliability and expected assurance, the highest scores were recorded among respondents from Montenegro, while the lowest were observed in Slovenia. Respondents from Slovenia reported significantly lower scores than respondents from all other countries, while respondents from Slovakia also reported lower scores compared to most countries, except Slovenia. For expected empathy, the highest scores were recorded in North Macedonia and the lowest in Slovakia. Respondents from North Macedonia reported significantly higher scores than respondents from all other countries, while respondents from Slovakia reported significantly lower scores compared to respondents from Serbia, Croatia, Montenegro, Bosnia and Herzegovina, and North Macedonia.

For perceived tangibility, respondents from North Macedonia reported significantly higher scores compared to respondents from Serbia, Bosnia and Herzegovina, Slovakia, Slovenia, and Montenegro. Respondents from Slovenia and Slovakia reported significantly lower scores than respondents from other countries. For perceived responsiveness, respondents from Montenegro reported significantly higher scores compared to all other countries. Respondents from Slovakia reported the lowest scores, while respondents from Slovenia also reported lower scores compared to most countries. Respondents from Croatia reported higher scores than respondents from North Macedonia, Bosnia and Herzegovina, Slovenia, and Slovakia.

For perceived assurance, respondents from Slovakia reported significantly lower scores compared to respondents from all other countries. A similar pattern was observed for perceived empathy, where respondents from Slovakia reported significantly lower levels compared to respondents from the other countries.

Gender of the respondent

According to the differences in expected and perceived spa service quality attributes in relation to gender (Table 9), statistically significant differences were identified for expected responsiveness ($Z = -2.078$, $p = 0.038$) and expected assurance ($Z = 2.142$, $p = 0.032$). Both differences are significant at the level of $p < 0.05$.

The results indicate that female respondents report higher perceived responsiveness compared to male respondents. For perceived assurance, male respondents report higher levels compared to female respondents.

Table 9. Comparison of the differences in the expression of observed and expected in relation to the sex of the respondents

Mann-Whitney U test	Z	p
Expected Tangibility	-0,271	0,786
Expected Reliability	-2,078	0,038*
Expected Responsiveness	0,296	0,767
Expected Assurance	2,142	0,032*
Expected Empathy	-1,180	0,238
Perceived Tangibility	-1,666	0,096
Perceived Reliability	0,071	0,944
Perceived Responsiveness	-1,298	0,194
Perceived Assurance	-2,650	0,008**
Perceived Empathy	-2,680	0,007**

$df=700$; $p<0,01$ **; $p<0,05$ *;

Source: Authors' calculations

Table 10. Comparison of the differences in the expression of observed and expected in relation to the age of the respondents

Kruskal-Wallis test	χ^2	p
Expected Tangibility	95,987	0,000**
Expected Reliability	134,801	0,000**
Expected Responsiveness	121,738	0,000**
Expected Assurance	74,282	0,000**
Expected Empathy	130,170	0,000**
Perceived Tangibility	72,873	0,000**
Perceived Reliability	58,771	0,000**
Perceived Responsiveness	96,561	0,000**
Perceived Assurance	44,093	0,000**
Perceived Empathy	37,739	0,000**

$df=4$; $p<0,01$ **;

Source: Authors' calculations

On the dimensions of the scale of perceived attributes of the quality of spa services, statistically significant differences in relation to gender were confirmed for the dimensions perceived Assurance ($Z=-2.650$, $p=0.008$) and perceived Empathy ($Z=-2.680$, $p=0.007$). Both obtained differences are significant at the significance level of $p<0.01$ and show that female respondents show significantly higher satisfaction with these dimensions compared to male respondents.

Age of the respondent

Regarding the age of respondents (Table 10), statistically significant differences were identified in both expected and perceived spa service quality attributes across all dimensions. All differences are significant at the level of $p < 0.01$. According to the Kruskal–Wallis test, the largest difference was recorded for expected responsiveness ($\chi^2 = 134.801$, $p = 0.000$), while the smallest difference was observed for perceived empathy ($\chi^2 = 37.739$, $p = 0.000$).

For the perceived quality dimensions, respondents aged 25 to 35 and 36 to 45 reported significantly lower values compared to respondents aged 46 to 55 and 56 to 65. In general, respondents in the 25 to 45 age groups showed both lower expectations and lower perceived quality of spa services.

One possible explanation is that younger and middle-aged respondents approach spa and wellness services with different preferences and usage patterns compared to older users. These groups may place more emphasis on service organization, consistency, and overall experience, which may influence both their expectations and their evaluations of service quality.

Education of the respondents

According to the level of education of the respondents (Table 11), statistically significant differences in spa service quality were identified across all dimensions of the expected attributes scale. For the perceived attributes scale, statistically significant differences were found for perceived tangibility, reliability, assurance, and empathy. All identified differences are significant at the level of $p < 0.01$. According to the Kruskal–Wallis test, the largest difference was observed for expected responsiveness ($\chi^2 = 82.262$, $p = 0.000$), while the smallest difference was recorded for perceived assurance ($\chi^2 = 15.224$, $p = 0.000$).

No statistically significant differences were found for the perceived empathy dimension in relation to the level of education of respondents.

Table 11. Comparison of the differences in the expression of observed and expected KSU in relation to the level of education of the respondents

Kruskal-Wallis test	χ^2	p
Expected Tangibility	57,653	0,000**
Expected Reliability	82,262	0,000**
Expected Responsiveness	40,869	0,000**
Expected Assurance	33,472	0,000**
Expected Empathy	42,504	0,000**
Perceived Tangibility	23,406	0,000**

Perceived Reliability	30,103	0,000**
Perceived Responsiveness	34,432	0,000**
Perceived Assurance	15,224	0,000**
Perceived Empathy	5,906	0,206

*df=4; p<0,01**;*

Source: Authors' calculations

Further analysis shows that, for expected tangibility, reliability, responsiveness, and assurance, respondents with doctoral and master's degrees reported significantly higher scores compared to respondents with college or university education. Similar results were observed for expected empathy, where respondents with doctoral and master's degrees reported higher expectations than those with lower levels of education.

For the perceived quality scale, respondents with doctoral and master's degrees also reported higher scores on the reliability dimension compared to respondents with college or university education. On perceived tangibility and reliability, respondents with doctoral degrees showed significantly higher scores compared to all other education groups, while respondents with master's degrees also reported higher scores than those with lower education levels. On perceived assurance, respondents with doctoral and master's degrees reported higher scores compared to respondents with secondary or university education.

In general, respondents with higher levels of education, particularly those with doctoral and master's degrees, show both higher expectations and higher evaluations of perceived service quality compared to respondents with lower education levels. This pattern suggests that more highly educated respondents apply more demanding and differentiated criteria when evaluating service quality. These respondents may pay more attention to organizational aspects, professionalism, communication, and consistency of service delivery, which makes them an important segment in spa tourism.

The amount of the respondent's monthly income

Comparative analysis by monthly income (Table 12) shows statistically significant differences in the scores for both expected and perceived spa service quality across all dimensions. All differences are significant at the level of $p < 0.01$. According to the Kruskal–Wallis test, the largest difference was observed for expected responsiveness ($\chi^2 = 138.285$, $p = 0.000$), while the smallest difference was recorded for perceived assurance ($\chi^2 = 62.479$, $p = 0.000$).

Table 12. Comparison of differences in the expression of observed and expected in relation to the amount of monthly income of respondents

Kruskal-Wallis test	χ^2	p
Expected Tangibility	29,525	0,000**
Expected Reliability	103,376	0,000**

Expected Responsiveness	138,285	0,000**
Expected Assurance	54,612	0,000**
Expected Empathy	94,581	0,000**
Perceived Tangibility	53,627	0,000**
Perceived Reliability	52,041	0,000**
Perceived Responsiveness	108,866	0,000**
Perceived Assurance	62,479	0,000**
Perceived Empathy	58,237	0,000**

*df=4; p<0,01**;*

Source: Authors' calculations

Further analysis shows that, for expected tangibility, responsiveness, assurance, and empathy, respondents with monthly incomes above 1001€ reported significantly lower scores compared to respondents with lower income levels and those who chose not to disclose their income. On expected responsiveness, respondents with incomes above 1001€ also reported lower scores than all other groups. In addition, respondents with incomes between 801€ and 1000€ reported lower expectations compared to respondents with incomes up to 500€, those with incomes between 501€ and 800€, and those who did not disclose their income.

For the perceived attributes of spa services, respondents with incomes up to 500€ reported significantly higher scores across all dimensions compared to respondents with higher income levels. Respondents who did not disclose their income also reported higher perceived scores compared to respondents with incomes between 801€ and 1000€ and those with incomes above 1000€.

These findings suggest that respondents with lower income levels tend to evaluate spa services more positively, which may be related to more moderate expectations or the higher perceived value of such services. Respondents with higher incomes may apply stricter evaluation criteria and compare services with a wider range of previous experiences.

Respondent's occupation

Regarding the occupation of respondents (Table 13), statistically significant differences were identified in both expected and perceived spa service quality across all dimensions. All differences are significant at the level of $p < 0.01$. According to the Kruskal–Wallis test, the largest difference was observed for perceived responsiveness ($\chi^2 = 116.330$, $p = 0.000$), while the smallest difference was recorded for perceived assurance ($\chi^2 = 44.170$, $p = 0.000$).

Table 13. Comparison of the differences in the expression of perceived and expected in relation to the occupation of the respondents

Kruskal-Wallis test	χ^2	p
Expected Tangibility	113,656	0,000**

Expected Reliability	54,549	0,000**
Expected Responsiveness	101,459	0,000**
Expected Assurance	96,922	0,000**
Expected Empathy	50,639	0,000**
Perceived Tangibility	101,206	0,000**
Perceived Reliability	116,330	0,000**
Perceived Responsiveness	72,193	0,000**
Perceived Assurance	44,170	0,000**
Perceived Empathy	68,803	0,000**

$df=4; p<0,01^{**}$;

Source: Authors' calculations

Further analysis shows that, across all dimensions of both expected and perceived spa service quality, respondents classified as workers or in the “other” occupation category reported significantly lower scores compared to all other occupational groups.

At the same time, these groups display relatively high expectations alongside their evaluations of perceived service quality. This pattern indicates that spa service users form a heterogeneous group, and their evaluations vary depending on professional background and lifestyle.

These findings should be interpreted with caution due to the uneven occupational structure of the sample. A large proportion of respondents, more than 45 percent, fall into the “other” category, which may influence the stability and interpretation of the results.

Discussion

The results of this study indicate that, although the differences between expected and perceived spa service quality are not large in absolute terms, they remain relevant from both theoretical and managerial perspectives. The identified gaps show that spa service users in Central and Southeastern Europe generally evaluate service quality positively, but they remain sensitive to specific shortcomings in service delivery. The most notable finding is that the largest gap was identified in the responsiveness dimension. Similar results were reported by Blešić et al. (2014), who identified reliability and responsiveness as key determinants of service quality in spa hotels. This indicates that users are particularly sensitive to inconsistencies in service delivery and place importance on dependability and trust.

Responsiveness has particular importance in spa and wellness tourism because these services are associated not only with leisure but also with health, recovery, relaxation, and overall well-being. Any inconsistency between expected and delivered service may therefore be perceived more strongly. This finding is

consistent with established service quality literature, which explains that users evaluate service quality through the comparison of expectations and actual service performance (Parasuraman et al., 1991; Grönroos, 1984).

A noticeable gap was also identified in the tangibility dimension. This result is expected due to the experiential nature of spa tourism. Physical environment, visual appearance, hygiene, ambiance, and equipment quality influence initial impressions and overall evaluations. Even when the core service is satisfactory, limitations in physical aspects may affect the perceived quality. This finding is consistent with previous research that highlights the importance of the service environment in spa tourism (Papadopoulou, 2020; Badulescu et al., 2024).

Empathy is the only dimension for which no statistically significant difference was identified between expectations and perceptions. Similar findings have been reported in earlier studies, where interpersonal aspects of service quality were evaluated more positively than functional aspects (Badulescu et al., 2024). This suggests that spa service providers in the observed region are relatively successful in delivering interpersonal elements such as courtesy, attention, and communication with guests.

The identified cross-country differences further indicate that expectations and perceptions of spa service quality depend on broader national and market contexts. These differences may reflect variations in tourism development, service standards, and prior user experience. This supports the view that service quality in spa tourism should be interpreted as context-dependent rather than uniform across countries.

Findings related to age, education, income, and occupation confirm that spa service users represent a heterogeneous group. Differences in expectations and evaluations suggest that users apply different criteria based on their characteristics. This has practical implications, as it indicates that spa and wellness providers should consider segmentation and service adaptation in order to meet diverse user needs.

From a theoretical perspective, this study contributes to existing literature in several ways. It confirms the applicability of the SERVQUAL framework in spa tourism research. It also shows that service quality is a multidimensional concept influenced by both service performance and user characteristics. In addition, the inclusion of respondents from seven countries provides a comparative regional perspective that is less represented in existing research. The study extends previous work by offering a cross-country analysis and highlighting the context-dependent nature of spa service quality.

Conclusions

This study examined the differences between expected and perceived quality attributes of spa services among respondents from seven countries in Central and Southeastern Europe: Slovakia, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, North Macedonia, and Serbia. The sample included 700 respondents of different gender, age, education level, occupation, and monthly income. The analysis was based on the SERVQUAL model and included five dimensions of spa service quality: Tangibility, Reliability, Responsiveness, Assurance, and Empathy.

The results showed relatively small differences between expected and perceived spa service quality at the level of the total sample. This indicates a generally positive evaluation of spa services among respondents. However, statistically significant differences were found for all dimensions except Empathy, which suggests that some quality gaps still exist despite the overall positive evaluation. The largest discrepancy was identified in the Reliability dimension, followed by Tangibility and Assurance, while the smallest difference was found in Empathy. These findings suggest that users are particularly sensitive to service consistency, dependability, and the physical environment of spa facilities.

The study also confirmed that differences in expected and perceived service quality are significantly related to selected socio-demographic characteristics, including country of origin, age, education, income, and occupation. This indicates that spa service users do not represent a homogeneous group, since their expectations and evaluations differ across user categories and national contexts. Service quality in spa tourism should therefore be understood as a multidimensional and context-dependent construct.

From a theoretical perspective, the study contributes to the existing literature by confirming the applicability of the SERVQUAL model in the context of spa and wellness tourism and by extending previous research through a comparative multi-country approach. The findings also show the importance of examining service quality through the discrepancy between what users expect and what they perceive.

From a practical perspective, the results may be useful for spa managers and decision-makers in designing more targeted service improvement strategies. Particular attention should be directed toward the dimensions in which the largest discrepancies were identified, especially those related to service reliability, operational consistency, and the tangible aspects of the spa experience. The identified socio-demographic differences also suggest that service providers should apply a more segmented and user-oriented approach in

order to better align service delivery with the expectations of different customer groups.

The study has several limitations. The research was based on a convenience sample and a cross-sectional design, which limits broader generalization of the findings. Future research should include more representative samples, additional psychographic and behavioral variables, and longitudinal approaches in order to provide a more comprehensive understanding of spa service quality and consumer behavior in tourism.

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UTICAJ ODABRANIH SOCIODEMOGRAFSKIH VARIJABLI NA RAZLIKE U KVALITETU OČEKIVANIH I PERCEPCIRANIH ATRIBUTA SPA USLUGA U CENTRALNOJ I JUGOISTOČNOJ EVROPI

Apstrakt

Rad ispituje uticaj odabranih sociodemografskih varijabli na razlike u kvalitetu očekivanih i percipiranih atributa spa usluga. U istraživanju je učestvovalo 700 ispitanika iz sedam zemalja Centralne i Jugoistočne Evrope: Slovačke, Slovenije, Hrvatske, Bosne i Hercegovine, Crne Gore, Severne Makedonije i Srbije. Procena kvaliteta spa usluga izvršena je merenjem razlike između očekivanih i percipiranih atributa kvaliteta spa usluga primenom SERVQUAL modela koji obuhvata pet dimenzija: opipljivost, pouzdanost, odgovornost, sigurnost i empatiju. Diskrepanca u okviru GAP modela izražena je kroz razlike između očekivanih i percipiranih atributa spa usluga. Proverom statističke značajnosti utvrđeno je da postoje značajne razlike u izraženosti očekivanih u odnosu na percipirane attribute na svim dimenzijama, osim dimenzije empatije, za koju statistička značajnost nije potvrđena.

Ključne reči: *velnes turizam, spa turizam, kvalitet usluga, SERVQUAL model, GAP model*

JEL: *O13, O18, R11, Z32*

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ARTIFICIAL INTELLIGENCE AND OTT PLATFORMS - ADVANTAGES AND RISKS

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Review Article

Abstract

Digital OTT (Over-The-Top) platforms, which provide users with catalogs of video and audio content, as well as streaming of linear channels, have entered a new phase of market competition through the application of artificial intelligence tools. However, due to the excessive automation of the distribution process, viewers are often deprived of content that they might otherwise choose to watch, as algorithmic models do not always enable such exposure. This paper analyses the positive and negative aspects of the contemporary technological phase through an examination of the application of AI tools, ethical standards, legal regulation, and user experience. For the purposes of examining contemporary habits and perceptions of users regarding OTT platforms, research was conducted using an online survey questionnaire. The results confirmed the initial assumption that users express concern in terms of the ethical application of AI technologies, and that the omnipresent personalization of content is not always desirable. On the other hand, an analysis of the business practices of Netflix, the most popular global video-streaming platform, confirms that the management of OTT platforms views artificial intelligence as a key tool for retaining existing subscribers and attracting new ones, with the aim of preserving a global market position, and to increase the revenue.

Keywords: *OTT platforms, artificial intelligence (AI), Netflix, algorithms, content personalization.*

JEL: *L82, L86, L15*

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Introduction

The era when television shows were watched exclusively in real time on TV receivers is surpassed. Digital technology has brought enormous expansion and transition regarding the media space (Liu et al., 2024). Immediately after the launch of YouTube in February 2005, as Google's video-sharing platform, the largest global OTT platforms (Over-The-Top)—Amazon Prime Video, Netflix, HBO, Disney+, Hulu, etc.—also began operating. As in the case of YouTube, their strategy was not to compete with television, but to cooperate with it in programming terms. According to data from July 2025, more than 65% of the world's population consumes OTT content, and OTT usage has increased significantly since the pandemic. In 2020, around 4.1 billion people used OTT services, and the number of users rose to 4.95 billion in 2023. It is estimated that the number of OTT users will continue growing and that by 2029 it will reach approximately 6.33 billion of people (Gaines, 2025).

Among the first was Netflix, formerly an online DVD rental service, which launched its first streaming service in 2007. With the help of the internet, which even then offered infrastructural support for the distribution of large quantities of video content, subscribers were enabled to watch television shows and films they had missed, on demand, on their computers. These developments indicate a significant shift in correlation between television and the internet which occurred at the end of the 2000s and in the first half of the 2010s. In this era of internet expansion, the internet began to position itself as a means of delivering and experiencing TV programs, rather than as an alternative to or extension of television (Johnson, 2019).

The phenomenon of watching multiple episodes of a series continuously, even whole seasons or several seasons in a row—the so-called binge-watching—emerged in the middle of the first decade of the twenty-first century. Netflix not only recognized the existence of this phenomenon, but also had detailed insight into which types of series people prefer watching in this manner. Netflix recognized the problem with DVDs in time and moved to “streaming,” where it only further consolidated its position as an intermediary between producers and users (Bošković, 2014). Over the past almost two decades, thanks to the increase in the quantity, technical quality, and program quality of content, as well as investment in their own production on a global level, two video-streaming platforms have stood out as dominant: Netflix and Amazon Prime Video. Today, these are the two most popular video-streaming platforms with the largest number of users. According to 2024 data, Netflix leads with more than 300 million subscribers worldwide (Manfredi, 2025).

Authors researching the impact of Netflix and video-streaming services on changes in the distribution, production, and audience of television series believe that no phase in the historical development of television series and serial programming has affected the quantitative and qualitative transformation of these forms as much as video streaming led by Netflix, and that this influence has taken place globally, simultaneously everywhere. They conclude that, thanks to new distribution technologies, users' habits, as well as the reasons why and how they watch series, have changed, and that series themselves therefore had to adapt in order to satisfy a different audience. This chain of changes is undoubtedly driven by technological progress, but its implications go far beyond the technological sphere (Milosavljević, Simeunović Bajić, 2025). Services capable of adapting and satisfying consumer preferences, while offering engaging content, have a greater chance of succeeding in today's highly competitive environment (Pandey et al., 2024). A solution for gaining a competitive advantage in the market, driven by users' shortened attention span, has been found in the development of new technologies and algorithmic systems. Consumer research suggests that a typical Netflix user loses interest after 60 – 90 seconds of browsing, having reviewed 10 to 20 titles (perhaps examining 3 of them in greater detail) on one or two screens (Gomez-Uribe, Hunt, 2016). Although internet television is a matter of choice, according to Gomez-Uribe and Hunt people tend to make suboptimal choices when faced with many options because they quickly become overwhelmed with content. Therefore, the basic idea is that content must be curated, and in the case of streaming shows and films, machine-learning-based recommender systems most often direct content curation (Chapman, Abraham, 2025). Algorithms cannot be inherently defined as good or bad. They work strictly according to the instructions given to them (Računarski fakultet, n.d.). A key element of these platforms' functionality is the sophisticated use of algorithms that personalize content recommendations (Liu et al., 2024).

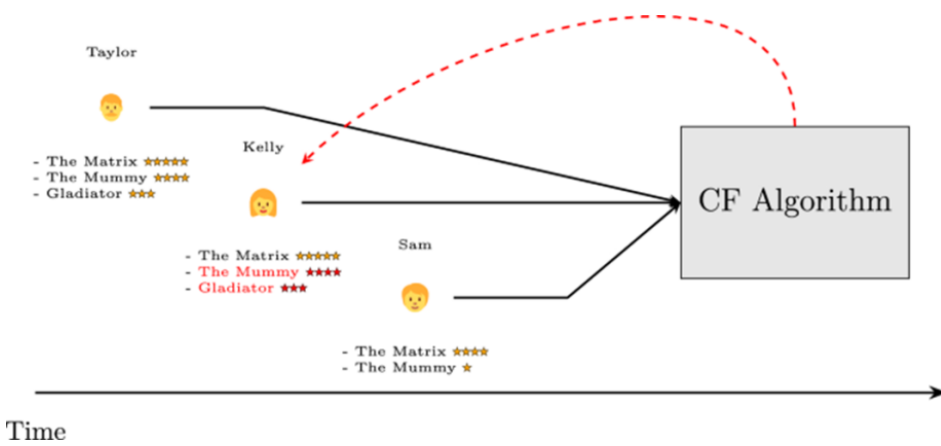
In the context of video-streaming platforms that have entered the era of artificial intelligence, multiple AI tools are available. Users are most exposed to algorithmic recommendations, which help them find relevant content in a personalized way. Current studies suggest that contemporary recommendation algorithms tend to exhibit a bias toward popularity in many contexts, often prioritizing widely consumed content in their recommendations (Klimashevskaja et al., 2024).

The platforms themselves have a justification for using this AI tool. For example, "How Netflix's Recommendation System Works" is presented to users as an explanation of how the subscription service offers an innovative

recommendation system designed to help them discover series, films, or games they are likely to enjoy (Netflix). Both Netflix and Prime Video offer personalized recommendations based on viewing history; however, Netflix distinguishes itself by providing percentage matches indicating how well a title aligns with a user’s profile. These two platforms also allow users to rate series and films, which should be incorporated into their algorithms (Gorringer, 2025).

One of the most promising recommendation algorithms is the so-called collaborative filtering algorithm—CF (Collaborative Filtering Algorithm). The following diagram presents an example of how this filtering works.

Figure 1. Diagram of collaborative filtering



Source: Munson et al., 2025.

This example involves three users, their viewing choices, along with recommendations generated based on similar interests. The first user (Taylor) watched “The Matrix,” “The Mummy,” and “Gladiator”, rating them 5, 4, and 3 stars, respectively, while Kelly watched “The Matrix,” and gave it a 5-star rating, while the third user (Sam) watched “The Matrix” and “The Mummy.” The data of each of these users contribute to the CF algorithm. Based on the similarity between Taylor and Kelly (i.e., both highly rated “The Matrix”), Kelly is recommended “The Mummy” and “Gladiator”. Note: The predicted ratings for Kelly correspond to Taylor’s ratings, as only Taylor’s data were used to generate her recommendations. Sam’s preferences (i.e., that he liked “The Matrix” while “The Mummy” did not appeal to him) do not influence Kelly’s recommendations, as his data are added later in the process (Munson et al., 2025).

A further step in increasing the complexity of collaborative algorithms is offered by so-called time weighting, i.e., the calculation of time weight. In this approach, greater importance is given to more recent user ratings than to older ones, enabling the tracking of changes in user preferences over time. These algorithms are used not only in e-commerce but also in recommending content on video-streaming platforms. Even the same user has quite different preferences for different items. The algorithm proposed by a group of authors uses clustering to distinguish between different types of items. For each category of items, changes in user interest were monitored, and a personalized decay factor was introduced based on individual viewing behavior (Ding, Li, 2005).

It should be noted that the use of algorithms on video-streaming platforms does not necessarily imply the use of artificial intelligence. AI is applied across multiple levels on these platforms, extending far beyond recommendation systems (*Recommendation Engine*) – although these remain the most invisible and widely recognized application – where it analyzes what users watch, how long they watch, what they interrupt, when they watch, what they like or dislike, and identifies similar users. Specifically, by analyzing user data, viewing history, and individual interests, OTT platforms aim to provide a personalized viewing experience. AI also enables personalization of the user interface (*User Interface Personalization*) — including the arrangement of content rows on the homepage, as well as the size and positioning of posters, meaning that no two users are presented with the same homepage. Additionally, AI enables the personalization of artwork and trailers (*Artwork Personalization*), whereby the system selects the most appropriate poster for a given piece of content for each user from the database (e.g., a pool of around 20 posters per title). A special tool is AI-driven search optimization (*AI Search Optimization*), where entering a term into the search field, for example ‘drama’, the system analyses, among other things, user intent, related terms, and contextual factors (such as the user’s typical viewing behavior). The use of AI is also significant in ensuring the accessibility of video-streaming platforms for persons with disabilities through automatically generated subtitles (speech-to-text), subtitle synchronization, translations, etc. AI systems can also anticipate user behavior, such as the likelihood of skipping the intro, enable automatic playback of the next episode, and can even pause playback if it detects user inactivity. Besides this, there are also AI tools that the user does not see which are used to improve the experience, such as so-called adaptive streaming – dynamic video quality adjustment, where technical parameters are adjusted if the user has poor internet, an inadequate device, low battery, etc. All of these AI tools are intended to encourage users to spend more time on the platform, which in turn leads to greater user engagement

and revenue growth. However, in addition to benefits and conveniences, this also raises ethical concerns that point out certain risks.

OTT platforms have revolutionized the way media is consumed by using artificial intelligence which provides tailored content recommendations, thereby improving the user experience and engagement. However, as AI algorithms become more sophisticated, concerns are also growing regarding data protection, algorithmic bias, and transparency (Singh et al., 2024). The dominant concern arises from the so-called “filter bubble” effect in recommender systems, that is, the question of whether they really lead to the isolation of users within certain content. According to a group of authors who carried out an extensive analysis of available studies, it has been confirmed that filter bubbles are present in recommender systems. They examined the basic causes of excessive personalization. The literature identifies algorithmic bias and cognitive bias as the primary causes of excessive personalization. Algorithmic bias arises when biases are introduced during the design and implementation of a system, while cognitive biases, such as confirmation bias, influence user interaction data (Qazi et al., 2023).

Video-streaming platforms claim that they use AI and users’ personal data exclusively to enhance the platform, particularly for content recommendation, informing users about relevant features, and personalizing content according to their interests. In such cases, content curation—that is, the deliberate selection, organization, filtering, and presentation of content to ensure that it is relevant, high-quality, and tailored to a specific audience—is performed by a “digital editor,” which determines what is worth displaying, in what order, and in what context. This is where the main problem arises. The lack of transparency of AI algorithms adds another layer of complexity to the problem of content curation on OTT platforms. Users often do not understand how recommendations are generated or why certain content is suggested to them, which leads to reduced trust in the system. In an era in which data-driven decision-making is becoming increasingly prevalent, the opacity of AI systems can foster skepticism and hinder user acceptance of the technology (Singh et al., 2024). It is precisely the relationship between user habits, expectations, and trust in AI that served as the primary motive for conducting this research.

Materials and Methods

For the purposes of this paper, a survey study entitled “Contemporary Consumerism – OTT Platforms” was conducted among the urban population

that uses the internet and video-streaming platforms. The research on users' habits and views about the use of AI algorithms on OTT platforms was conducted by means of a survey, using an online questionnaire on the Google Forms platform. Data were obtained from 405 respondents, predominantly from Belgrade. The questionnaire was completed by 63.2% female respondents (256 persons) and 36.5% male respondents (148 persons). In terms of age, respondents were aged 18–24 (29.9%, n = 121), 25–34 (15.6%, n = 63), 35–44 (21.5%, n = 87), 45–54 (23.2%, n = 95) and 55+ (9.9%, n = 40). In terms of education level, 135 respondents (33.3%) had secondary education, 152 of them (37.5%) higher education, 73 respondents (18%) master's degree, and 55 respondents (13.6%) a doctoral degree.

Given that the research is focused on the behavior of OTT platform users in an urban environment, the sample predominantly from Belgrade is used as purposive sampling, and the results are interpreted within the framework of the urban population. The survey, conducted between 20 October and 20 November 2025, consisted of 27 questions covering demographic characteristics (four questions), OTT usage habits (six questions), content-related behavior (four questions), the application of artificial intelligence and user responses (eight questions), and attitudes toward its ethical implications (four questions).

Results

The findings of the study on user habits and perceptions among contemporary viewers indicated that, of the 405 respondents, as many as 54.1% spend between one and three hours per day on video content, 21.7% between three to five hours, 16% less than one hour, while 8.1% spend more than five hours daily. When asked which OTT platforms they use, more than half of the participants, as many as 54.6% (221 persons), reported using Netflix; 39.5% use EON (160 respondents), 34.3% HBO Max (n = 139), YouTube Premium is used by 31.9% of respondents (129), 20.2% use RTS Planeta, while the others mostly use Disney+, RTL+, and other platforms. A majority of users, 54.3% (220 of them), follow content on an OTT platform every day; 31.6% (n = 128) do so several times a week; 6.2% once a week; and 7.9% of respondents less frequently. When it comes to the device most often used to access content, smart TVs are in a slight lead, used most widely by 40.7% (n = 165) of respondents, compared with mobile phones—39% (n = 158) of respondents. These are followed by laptops or desktop computers—17.5% (n = 71) users—while tablets are used for these purposes by only 2.7% (n = 11) of users.

A third of respondents most frequently watch TV series on OTT platforms—33.6% of respondents (n = 136)—followed by films, 18.8% (n = 76

respondents), while there is relatively balanced interest in news programs—12.8%, sport 12.3%, and music 12.1%; the rest mostly watch documentaries and children’s content. Despite the considerable amount of time spent on OTT platforms, a large proportion of respondents, as many as 62.5% (253 persons), reported that they were partially satisfied with the content offer on the platforms they follow; 28.4% (n = 115) were very satisfied, while 9.1% (n = 37) were dissatisfied. As many as 85.2% (n = 345) claimed that the quality of content is the most important factor when choosing a platform; ease of use was given priority by 20.7% (n = 84) of respondents, subscription price was valued by 20% (n = 81), while 5.9% (n = 24) emphasized the importance of personalized messages and 3.2% (n = 13) the importance of local content. According to origin, only 15.6% (n = 63) said that they preferred domestic programs, 40% (n = 162) favored foreign programs, while a combination of domestic and foreign programs was most commonly chosen by 44.4% (n = 180) of respondents. In line with the previous findings, 40.2% (n = 163) of respondents consider it only moderately important whether the platform offers locally produced programs; 12.8% (n = 52) find this highly important; for 16% (n = 65) it is of little importance. The remaining responses were distributed across the intermediate points on the scale: it is considered important by 14.3% of respondents (n = 58), and not important by 16.5% (n = 67).

Since the central topic of the research is content recommendation, this concept is introduced in the questionnaire through a set of questions. Participants first had the opportunity to answer the question of how often they share their impressions or recommendations about content (e.g., on social media). 33.6% of them (n = 136) reported that they rarely share content, 30.9% (n = 125) never share it, 25.9% (n = 105) do this occasionally, while only 9.6% (n = 39) often share their impressions and recommendations. As for the recommendations offered by the application itself, as many as 65.2% (n = 264) sometimes use them, 18.5% (n = 75) do not use them at all, and 16.3% (n = 66) mostly rely on recommendations.

Four-fifths of respondents—80.2% (n = 325)—are aware that platforms use artificial intelligence to recommend content; 13.1% (n = 53) have some doubts about it, while 6.7% (n = 27) stated that they are not aware of it. A high percentage of respondents—as many as 80.5% (n = 326)—are partially satisfied with the accuracy of the recommendations they receive; 15.1% (n = 61) are very satisfied, while 4.4% (n = 18) reported being dissatisfied. When asked whether the platform understands their tastes and preferences, over half of respondents, 56% (n = 227), indicated that it generally does; 31.9% (n = 129) stated they didn’t have that impression, while 12.1% (n = 49) answered in the negative. For

almost two-thirds of respondents—64.4% (n = 261)—it is not particularly important that the recommendations they receive on OTT platforms be personalized. 22.7% (n = 92) stated that personalized recommendations are very important to them, while 12.8% (n = 52) said they do not want personalization.

Around two-fifths of users—40.2% (n = 163)—feel that artificial intelligence influences what they watch (e.g., that it directs them toward certain types of content); 37.8% (n = 153) partially have that feeling, while 22% (n = 89) do not feel that artificial intelligence manipulates them by guiding them toward what they should watch. When asked whether they believe that artificial intelligence can manipulate the choice of content they watch, for example by promoting certain views or products, as many as 51.4% (n = 208) answered in the affirmative; 33.6% (n = 136) stated that it sometimes does; 8.6% (n = 35) indicated “rarely”; while 6.4% (n = 35) do not believe that AI may influence user choices.

In this regard, 66.2% (n = 286) of respondents stated that they would like greater transparency regarding how recommendations are created (e.g., why something was suggested to them), while 33.8% (n = 137) did not support this. When asked about the protection of personal data, that is, whether they are concerned about the privacy of the data the platform uses for personalization, almost one-third of respondents declared they were highly concerned—30.4% (n = 123); almost half of respondents are partially concerned—47.2% (n = 191); while 22.5% (n = 91) are not concerned at all.

Artificial intelligence also offers AI assistants in various fields. One question in this survey addressed user needs. Thus, 35.3% (n = 143) of respondents answered that it would be interesting if the platform offered an interactive AI assistant that recommends content based on their engagement with AI, 34.3% (n = 139) were not sure how they would react, while 30.4% (n = 123) would not want this form of communication.

Over half of respondents, 51.4% (n = 208), believe that platforms should clearly label content that was created or adapted by artificial intelligence; 27.9% (n = 113) would apply labeling only to fully AI-generated content; 11.9% (n = 48) believe that it is not necessary; while 8.9% (n = 36) are not sure.

For 59.8% (n = 242) of users, it is highly important that AI systems on platforms operate in an ethically responsible way, e.g., without bias, discrimination, or manipulation. It is considered important for 16% (n = 65) of users, partially important for 15.8% (n = 64), less important for 3.2% (n = 13), and unimportant for 5.2% (n = 21) of users. In terms of users’ trust that the platform uses their data ethically and exclusively for personalization purposes, almost half of

them—47.9% (n = 194)—have limited trust, 33.3% (n = 135) do not have trust at all, 10.1% (n = 41) are unsure, while 8.6% (n = 35) have complete trust in it.

Taken together, 39.3% (n = 159) of respondents reported that they believe the use of artificial intelligence on platforms can affect users' freedom of choice; 24.2% (n = 98) are unsure; 20.7% (n = 84) think that it does not have a significant impact; while 15.8% (n = 64) recognized the advantages of AI and believe that it does not restrict freedom of choice, but rather expands it.

Discussion

The conducted study, carried out on an adult urban population of OTT platform users, is consistent with current trends in shaping viewing habits. Today's media landscape, reshaped by the rapid rise of new media, has become markedly more dynamic and complex. As a result, most media organizations perceive it as increasingly competitive, where the choice of content to be distributed plays a decisive role. In the struggle to capture the attention of viewers—modern consumers of media content—media outlets face a fundamental question: what content should be offered, and how should it be presented? The starting point lies in a thorough understanding of the audience (Ćitić, 2025).

Research conducted in Serbia, focusing on the impact of Netflix's recommendation system in smaller markets, suggests that algorithms do more than simply adapt content to users' preferences—they also subtly shape those preferences. This becomes particularly evident in the consistent promotion of new seasons of popular and highly rated series, even when users have not previously shown interest in that genre. Recommendations for shows such as "The Lincoln Lawyer" illustrate this tendency. However, there are two even more telling examples of this algorithm manipulation (Milosavljević, 2023). One such mechanism is the personalization of artwork (posters), tailored to individual viewing profiles. By analyzing identical content—such as the series "Lupin" and "Sex Education"—the study found that different users were shown different promotional images (artworks). For instance, a viewer inclined toward mystery and comedy might see "Lupin" represented by an image of the protagonist holding a book while facing camera, evoking intrigue. Meanwhile, an "ideal" user profile might be presented with a more cinematic scene: the character standing at a height at night, overlooking a brightly lit Paris. A viewer who prefers domestic content, however, could encounter a completely different image—one depicting the main actor holding a dog. Moreover, the study highlights that not only are popular series persistently recommended, but after just a week of diverse viewing activity across different profiles, the system

begins to identify certain titles as highly compatible with all users—regardless of their initially distinct tastes (Milosavljević, 2023).

Such practices raise concerns about the so-called filter bubble effect, whereby users are repeatedly exposed to similar content, potentially creating a form of “tunnel vision” and limiting the diversity of what they consume. Ethical questions also arise regarding transparency and the extent to which users retain autonomy in choosing content from a broader range of options (Yasmeen & Hashmat, 2025). At the same time, some researchers argue that these effects can be mitigated through alternative algorithmic approaches. One such proposal is the AbIN model, an innovative framework based on opposing yet interdependent dimensions. It seeks to balance the information that algorithms typically emphasize with content that is usually overlooked, drawing on the principles of the Y- and Y+ theory (Wang et al., 2024).

According to research conducted by Deloitte in the United States, Generation Z shows greater interest in video content on social media than in binge-watching series on video streaming platforms. This shift presents a new challenge for algorithms: how to re-engage this audience, which increasingly trusts recommendations from social media influencers more than the algorithmic suggestions offered by streaming platforms themselves (Deloitte, 2025).

As OTT platforms attempt to strike a balance between personalization and privacy, ethical considerations are becoming increasingly prominent. The design of AI algorithms must prioritize reducing bias and enhancing fairness. Respecting user autonomy and providing users with control over their data and preferences are essential for building trust and ensuring a positive user experience (Singh et al., 2024). Existing research suggest that fundamental rights are significantly affected by AI-driven recommendation systems. In particular, concerns have been raised regarding the impact on human dignity, autonomy, integrity, privacy, freedom of information, equality, non-discrimination, and diversity (Sorbán & Kinga, 2021).

Table 1. Risk Map of AI-Based Recommendation Systems

Affected rights	Risk
Human dignity – autonomy	Lack of transparency – “black box”

Affected rights	Risk
Integrity	May lead to addiction; exposure to inappropriate content
Privacy	User profiling and data leakage; data disclosure; algorithm design; user interface design; experimentation on user groups
Freedom of information	Filter bubble; lack of transparency – “black box”
Equality and non-discrimination	Activity bias; algorithmic bias; users’ cognitive biases
Diversity	Lack of transparency – “black box”; limited diversity in recommendations

Source: Sorbán & Kinga, 2021.

The widespread adoption of artificial intelligence has highlighted the need for regulation and normative frameworks governing AI technologies. A significant contribution in this regard comes from a study conducted by a group of researchers who analyzed 200 documents published by institutions and companies worldwide. Their findings indicate that countries face considerable challenges in defining guidelines and regulations, largely due to the complexity of competing interests involved. They also emphasize that, for most stakeholders, the development and operation of systems and applications that affect large populations remain a “black box”—a lack of understanding of how algorithms function. All relevant actors should be informed about the internal processes that regulate and shape their environment. According to the authors, transforming today’s largely deregulated AI industry may require stronger governmental oversight, combined with a shift in the culture of AI development. Many developers are already aware of the risks and shortcomings of such technologies—shortcomings that disproportionately affect the most vulnerable groups (Corrêa et al., 2024). In addressing ethical challenges, the authors argue that a range of strategies can be employed to balance personalization and privacy. The implementation of robust data protection measures, such as anonymization and encryption, can safeguard user identity and sensitive information. An “opt-in” approach, allowing users to actively choose whether to participate in personalized recommendation systems, supports respect for user autonomy and individual boundaries (Dr. Mansi Singh, et al., 2024). Furthermore, the development of so-called explainable AI systems can provide

users with transparent explanations of why specific content is recommended to them, thereby enhancing algorithmic transparency and improving users' understanding of how these systems operate.

Conclusion

The analysis of the research results, based on a survey examining contemporary consumer behavior and OTT platforms, confirms concerns regarding the potential risks and ethical issues associated with the misuse of user data, particularly in the context of algorithmic manipulation. Since participants do not express a uniform stance toward personalized recommendations generated through algorithmic curation, it can be concluded that the use of AI tools—while not always welcomed—offers both benefits and risks. Maintaining user trust and ensuring fair practices requires addressing key challenges, including algorithmic bias, data privacy, and broader ethical considerations. Looking ahead, further advancements should prioritize transparency, interoperability, and fairness, while adopting cutting-edge AI methodologies to enhance personalization and optimize user interaction (Arshad et al., 2025). In this context, the development of OTT platforms—shaped by both market competition and the establishment of clearer regulatory frameworks—should place a strong emphasis on improving user experience, expanding content choice, and strengthening the trust and loyalty of contemporary media consumers.

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VEŠTAČKA INTELIGENCIJA I OTT PLATFORME – PREDNOSTI I RIZICI

Tatjana Ćitić

Apstrakt

Digitalne OTT (Over-The-Top) platforme, koje korisnicima nude kataloge video i audio sadržaja, kao i strimovanje linearnih kanala, primenom alata veštačke inteligencije ušle su u novu fazu tržišnog takmičenja. Međutim, usled prekomerne automatizacije procesa distribucije, gledaoci često ostaju uskraćeni za sadržaje koje bi možda želeli da pogledaju, ali im algoritamski modeli to ne omogućavaju. U ovom radu analiziraju se pozitivni i negativni aspekti savremene tehnološke faze kroz razmatranje primene AI alata, etičkih standarda, pravne regulative i korisničkog iskustva. Za potrebe ispitivanja savremenih navika i percepcije korisnika OTT platformi sprovedeno je istraživanje putem onlajn anketnog upitnika. Rezultati su potvrdili polaznu pretpostavku da korisnici izražavaju bojazan u pogledu etičnosti primene AI tehnologija, kao i da sveprisutna personalizacija sadržaja nije uvek poželjna. S druge strane, analiza poslovnih praksi najpopularnije globalne platforme za video striming, Netflix, potvrđuje da menadžment OTT platformi posmatra veštačku inteligenciju kao ključni alat za zadržavanje postojećih i privlačenje novih pretplatnika, sa ciljem očuvanja globalnog tržišnog položaja i povećanja prihoda.

Ključne reči: OTT platforme, veštačka inteligencija (AI), Netflix, algoritmi, personalizacija sadržaja.

JEL: L82, L86, L15

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Nikola Nikolić¹, Petar Petrović², Marko Marković³

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