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МЕЂУНАРОДНИ ЧАСОПИС
ЗА ЕКОНОМСКУ ТЕОРИЈУ И ПРАКСУ И ДРУШТВЕНА ПИТАЊА

ЕКОНОМИКА

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ИЗДАВАЧ: Друштво економиста "Економика" Ниш
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ARTIFICIAL INTELLIGENCE AND IT'S INFLUENCE ON SUSTAINABLE TRAVEL AGENCIES BUSINESS: THE ROLE OF CHATBOTS IN CREATING TOURIST ARRANGEMENTS

Abstract

Among the innovations that have garnered significant attention is the use of chatbots, which serve as automated agents designed to facilitate communication and streamline processes for both travel agencies and their clientele. This paper will explore how chatbots contribute to the sustainability of agency businesses by enhancing operational efficiency, improving customer experience, and embodying modernity and innovation. The research included 243 travelers who used ChatGPT for their trips, and factor analysis and Structural Equation Modeling (SEM) were used to analyze the data. The result was that chatbot users gather their positive experiences around three key factors: Simplicity of travel, Frequency of travel and Organization of travel, which confirmed the main hypothesis H that the deployment of chatbots not only aligns agency businesses with contemporary trends but also significantly enhances their operational efficiency, customer satisfaction, and overall market presence. One of the main limiting factors for the application of chatbots is the low prevalence of software that has such functions. The adoption of chatbots serves as a clear indicator of modernity and innovation within agency businesses, positioning them as forward-thinking entities in an ever-evolving market.

Key words: *AI, travel agencies business, chatbots, business sustainability, SEM*

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ВЕШТАЧКА ИНТЕЛИГЕНЦИЈА И ЊЕН УТИЦАЈ НА ОДРЖИВО ПОСЛОВАЊЕ ТУРИСТИЧКИХ АГЕНЦИЈА: УЛОГА ЧЕТБОТОВА У КРЕИРАЊУ ТУРИСТИЧКИХ АРАНЖМАНА

Апстракт

Међу иновацијама које су привукле значајну пажњу је употреба цхатботова, који служе као аутоматизовани агенти дизајнирани да олакшају комуникацију и поједноставе процесе како за туристичке агенције тако и за њихову клијентелу. Овај рад ће истражити како чет-ботови доприносе одрживости агенцијског пословања тако што побољшавају оперативну ефикасност, побољшавају корисничко искуство и доприносе модернизацији пословања и иновативности. Истраживање је обухватило 243 путника који су користили ЦхатГПТ за своја путовања, а за анализу података коришћена је факторска анализа и Моделирање структурних једначина (СЕМ). Резултат је био да корисници цхатбот-а своја позитивна искуства прикупљају око три кључна фактора: поједностављена путовања, учесталост путовања и организација путовања, што је потврдило главну хипотезу Х да увођење цхатбота не само да усклађује пословање агенција са савременим трендовима већ и значајно унапређује њихову оперативну ефикасност, задовољство купаца и укупно присуство на тржишту. Један од главних ограничавајућих фактора за примену цхатбот-а је ниска распрострањеност софтвера који има такве функције. Усвајање цхатботова служи као јасан показатељ модерности и иновација у агенцијским пословима, позиционирајући их као субјекте који размишљају о будућности на тржишту које се стално развија.

Кључне речи: *вештачка интелигенција, пословање туристичких агенција, цхатботс, одрживост пословања, СЕМ*

Introduction

The advent of technology has transformed various sectors, with the travel industry being one of the most significantly impacted (Ku & Chen, 2024; Bešić et al. 2024). Among the myriad of innovations, artificial intelligence (AI) stands out as a pivotal force (Abou-Foul, 2023), particularly through the integration of chatbots (Dwivedi et al., 2023). According to Li et al. (2021) these AI-driven tools have begun to reshape the way sustainable travel agencies conduct their business, particularly in crafting tourist arrangements (Ku, 2022). As the global emphasis on sustainability grows, chatbots not only enhance operational efficiency but also promote sustainable tourism practices (Wang et al. 2024).

The integration of chatbots within sustainable travel agencies marks a significant evolution in the travel industry. Chatbots are AI-powered software applications designed to simulate conversation with human users, particularly over the internet (Kayeser,

2024). Their utilization in travel agencies is primarily aimed at improving customer service through instant communication. For sustainable travel agencies, the benefits of employing chatbots are manifold (Scarpi, 2024). They can handle a vast number of inquiries simultaneously, allowing agencies to operate efficiently without compromising on service quality. For instance, companies like Booking.com and Trivago have successfully implemented chatbots that assist travelers in finding eco-friendly lodging and travel options (Fraccastoro et al., 2021), showcasing how technology bridges the gap between customer needs and sustainable choices (Schuetzler et al., 2020; Hsu & Lee, 2023). Furthermore, these AI tools can provide real-time assistance on sustainability measures taken by the travel agency, enhancing transparency and building trust with environmentally conscious consumers (Krakowski et al., 2022). Such successful implementations suggest that chatbots can play an integral role in promoting the principles of sustainability within the travel sector.

Enhancing customer experience is another crucial role that chatbots play in sustainable travel agencies. The advantage of 24/7 availability cannot be overstated; customers can receive immediate responses to their inquiries at any hour, removing the frustration of waiting for business hours to connect with a representative (Kanan, 2019). This instant communication is particularly beneficial for international travelers who may be operating across different time zones (Haptik, 2022). Moreover, chatbots can provide personalized travel recommendations tailored to individual user preferences, analyzing past interactions and customer data to suggest trips that align with sustainable practices. For example, a user interested in eco-tourism may receive recommendations for destinations renowned for their conservation efforts, thus promoting responsible travel choices. Additionally, chatbots streamline the booking process by guiding customers through each step, reducing wait times and minimizing the likelihood of errors. This seamless user experience not only satisfies consumer expectations but also encourages them to engage with sustainable travel options more readily, thereby fostering a culture of responsible tourism (Adam eet al., 2021).

The role of chatbots extends beyond mere customer service; they are instrumental in promoting sustainable tourism practices. By providing comprehensive information about eco-friendly travel options, chatbots empower tourists to make informed decisions (Schanke et al., 2021). For instance, a chatbot could outline the benefits of staying at a green-certified hotel or the carbon footprint of various transportation methods, thereby encouraging responsible choices (Yu et al., 2022). Additionally, chatbots can promote responsible travel behaviors by proactively sharing tips on minimizing waste, respecting local cultures, and contributing to conservation efforts. Furthermore, through interactions with users, chatbots can collect valuable data on customer preferences and behaviors, enabling sustainable travel agencies to tailor their offerings accordingly (Zhou, C., & Chang, 2024). This data-driven approach allows agencies to create customized sustainable travel packages that resonate with the values of eco-conscious consumers, thus enhancing customer satisfaction while promoting sustainable practices (Li et al., 2023).

This paper will explore the integration of chatbots into sustainable travel agencies, their role in enhancing customer experiences, and their contribution to promoting eco-friendly travel options. By critically analyzing these facets, we can understand how chatbots are not just technological advancements but essential partners in the movement

towards sustainable tourism. The work started from the starting hypothesis of the work that the use of chatbots in agency business contributes to the sustainability of business because agencies keep up with the times and modern changes, which is reflected in the greater number of trips. At the same time, this AI tool serves as a powerful motivator that stimulates tourist needs and thereby influences the increase in the sale of arrangements. A conclusion has been reached that the use of chatbots contributes to Simplicity of travel, Frequency of travel as well as better Organization of travel.

Theoretical backgrounds

In practice though, there are several types of chatbots in business. Acccording to Larsen & Følstad (2024) the simplest type are Rules-based chatbots.This is today's simplest chatbot type. It works with buttons, which is how people would engage with it— using predefined options. In most cases, such chatbots also require several selections by a person so that they can answer with something that would be relevant. Hence, bots have the longest user journey and take the slowest in leading the customer to his/her goal. However, this type of bot works best where lead qualification is concerned. The question is posed by the bot, people answer by pressing any one of the options available, and then the bot, which already has defined answers for this, will make the statement. For some other more complicated things, such chatbots are not so good since they can not decide anything on their own —and this is the reason there are chatbots supported by artificial intelligence (Lin et al., 2022).

Aaccording to (Luo et al., 2029), Chatbots based on artificial intelligence also exist. Artificial intelligence (AI) is a simulation of human intelligence. AI is a field of computer science but is actually an endeavor to create intelligent machines that work and think like humans do (McLean et al., 2021). It can understand free language, but has a pre-defined flow to make sure the problem is solved. It remembers the context of the conversation and the users' preferences. Can jump from one conversation point to another. Therefore, it will address a random user request at any time. These use machine learning, artificial intelligence and natural language processing to understand people.

According to Han et al., (2023) Intellectually independent chatbots deploy machine learning, the capacity with which the chatbot learns from the inputs and the requests of the user (Meyer et al., 201). Machine learning is defined as the ability of computers to learn from data on their own accord by detecting patterns and making decisions with little human interference (Nilashi et al., 2022). Intellectually independent chatbots are specifically trained to understand certain keywords and phrases that would prompt the bot to respond in any way. They are only getting better with time, understanding more and more questions. One could say they learn by doing and get better with practice (Markovitch et al., 2024).

One of the great advantages of chatbots is that, unlike applications, they are not downloaded, do not need to be updated, and do not take up space in the phone's memory. Another possibility we have is to integrate several bots in the same chat. Online chatbots automate customer support, thereby saving time and effort. They are also applicable to some other business tasks such as collecting data from customers, helping to organize meetings, and reducing overhead costs. No wonder the market for chatbots is of an

imposing size. Automatization and digitization are the crucial factors in the sphere of tourism development (Mandić et al., 2024). The key reason for it is not the replacement of the personnel but a complete liberation of employees from routine functions and later optimizing the work-hours factor of quality service and subsequent customer satisfaction plus resource-saving effects. Several companies set this as a goal within the framework of growth and development in their digital footprint and existence towards which they provide clients with chat conversations with a virtual assistant (Melian-Gonzalez et al., 2021).

This year, 80% of businesses will interact with consumers over a chatbot, according to (Mandić et al., 2024). But does this apply to tourism? According to Software Advice, an organization that performs research on technologies, in the report's survey results 91% of travelers would use smart self-service platforms if provided with the necessary information or service. Since 1966 chatbots were just imitating communication with the people by sending written messages (Meyer et al., 2014). Today, chatbots can respond by sending images, video clips, audio messages, pdf files, and even VR. The technology allows the chatbot to "understand" what the client wants and respond according to pre-programmed information. The virtual assistant works 24/7 and can communicate in several languages to help a big lot of consumers at the same time (Omarov et al., 2022).

It can be integrated into a business messenger account or a website as a software solution. Other than answering frequently asked questions, it can do several other duties too which are integrated to the database and other platforms to make reservations, to take requests for organizing events, room service, massages, and to reserve a table at a restaurant. The hotel or restaurant manager only needs to make a choice on what the chatbot will do to contribute to the business, staff, and consumers (Pham, 2024).

Methodology

Total Number of 243 travelers who used ChatGPT for their trips took part in the research. Of the total number of passengers, 140 (57.6%) were male, and 103 (42.4%) were female. Respondents used artificial intelligence to plan their trips, and they were referred to AI by travel agents in several travel agencies in Novi Sad (Top Travel, Grand Tours and Šajka). When they arrived at travel agencies in the period from February to August 2024, they left their e-mail addresses, to which they were then sent a link with questions that had to be answered on a five-point Likert scale. The questions were grouped by similarity, and then the responses were analyzed using factor analysis. The model with the highest factor loading was then reached through the elimination system.

Factor 1. Simplicity of travel
v1 They direct me to interactive maps
v5 Travel decisions are made easier

Factor 2. Frequency of travel
v2 Travel is more meaningful
v4 More frequent travel
v7 Having a personal guide in pocket

Factor3. Organization of travel
v8 Saves resources, money and time
v3 Route suggestions are creative

The paper started from the starting hypothesis of paper H that the use of chatbots in agency business contributes to the sustainability of business because agencies keep up with the times and modern changes, which is reflected in the greater number of sold tourist arrangements and trips. In order to verify the initial hypothesis, it was necessary to answer three questions: In what way do chatbots contribute to the sustainability of travel agency business? What makes agency businesses viable when it comes to chatbots? How do chatbots contribute to the sustainability of agency business? In order to answer these questions, it was necessary to set sub-hypotheses of the work. The first sub-hypothesis h1: The role of chatbots in agency business is to enable the simplicity of travel for end users; Second sub-hypothesis h2: Chatbots represent a personal AI assistant; Third sub-hypothesis h3: Chatbots contribute to saving time and money.

Structural Equation Modeling (SEM) is like a multivariate approach to the application of a structural model to indicate causal relationships between observed variables. SEM is the technique that exposes these links amongst dependent data using path coefficients highlighting the degree to which these connections are strong. SEM is the powerful technique that can handle multicollinearity; in fact, it occurs when any variable has very high correlations with two or more other variables. One of the advantages of SEM over multiple regressions and factor analysis is that SEM has to be guided by all components of modeling. Model development and refinement are heavily dependent on theory. Major misuse might happen in SEM if the data are just adapted to fit any of the SEM rightly and then further expansion of theory based only on the results of the analysis.

Research results and Discussion

Factor analysis (see Table 1 and 2) yielded a model that categorizes the variables into three factors, which together account for 71.414% of the variance.

Table 1. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,010	28,708	28,708	2,010	28,708	28,708
2	1,805	25,791	54,499	1,805	25,791	54,499
3	1,184	16,915	71,414	1,184	16,915	71,414
4	,807	11,524	82,938			
5	,665	9,502	92,440			
6	,333	4,764	97,204			
7	,196	2,796	100,000			

Source: Prepared by the authors (2024)

Table 2. Component Matrix

	Factors		
	1	2	3
v1	,459	-,005	,728
v2	,663	-,650	,023
v3	,485	,605	-,304
v4	,526	,262	,180
v5	-,418	-,097	,690
v7	,591	-,704	-,166
v8	,568	,666	,158

Source: Prepared by the authors (2024)

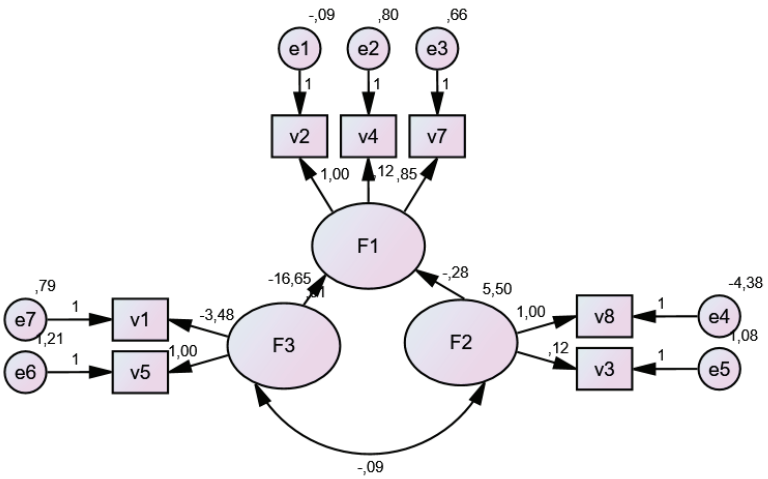
Table 2 shows the factors and variables grouped around them. Factor 1. "Simplicity of travel" answered the first question: In what way do chatbots contribute to the sustainability of travel agency business? Chatbots have emerged as a fundamental tool for travel agencies, characterized by their ability to provide instantaneous customer service and support. One of the most significant advantages of chatbots is their availability, which allows users to inquire about travel options, make bookings, and resolve issues at any hour of the day. This feature is particularly beneficial for travelers in different time zones or those seeking immediate assistance late at night or early in the morning. Additionally, chatbots can offer a level of personalization that enhances the user experience. By utilizing data analytics and machine learning algorithms, chatbots analyze user preferences and previous interactions to deliver tailored travel recommendations. For example, if a user frequently books family-friendly resorts, the chatbot can prioritize similar options in future searches, making the planning process more efficient and enjoyable. The ability to provide customized suggestions not only increases user satisfaction but also fosters loyalty, as clients are more likely to return to agencies that understand and cater to their individual needs.

Factor 2. "Frequency of travel" answered the second question: What makes agency businesses viable when it comes to chatbots? The applications of chatbots as personal AI assistants are extensive and varied, significantly impacting sectors such as customer service, personal productivity, and e-commerce. In customer service, chatbots offer 24/7 availability, addressing customer inquiries and resolving issues without human intervention. Moreover, chatbots enhance personal productivity by assisting users with scheduling, reminders, and task management. Applications like Microsoft Teams employ chatbots to help users organize meetings and track deadlines, streamlining workflow and reducing the cognitive load on individuals. In the realm of e-commerce, chatbots play a pivotal role in guiding customers through the purchasing process, offering personalized product recommendations, and answering questions about products. Shopify's chatbot integration, for instance, enables businesses to engage customers in real-time, increasing conversion rates and enhancing the overall shopping experience.

Factor3. "Organization of travel" answered the third question: How do chatbots contribute to the sustainability of agency business? Unlike human agents who are restricted by working hours, chatbots can handle inquiries 24/7, ensuring that customers receive assistance at any time of the day or night. For instance, a customer attempting to

purchase a product at midnight can receive immediate answers to their questions about product specifications or shipping options, thereby enhancing their shopping experience. Furthermore, chatbots boast rapid response times, often delivering answers in mere seconds, which is a stark contrast to human agents who may take minutes to respond due to factors like workload or personal schedules. This swiftness not only satisfies customers but also frees human staff from handling routine inquiries, allowing them to focus on more complex issues that require human empathy and problem-solving skills. Consequently, businesses can allocate their human resources more effectively, reducing the strain on customer service teams and improving overall operational efficiency. In addition to streamlining operations, chatbots significantly reduce operational costs for businesses. The most apparent cost-saving benefit stems from the decrease in labor costs associated with customer service representatives. By implementing chatbots, tourist agencies can limit the number of human agents needed to manage customer inquiries, as a single chatbot can handle thousands of requests simultaneously. This not only cuts down on salary expenses but also lessens the financial burden of employee benefits and overhead costs. Moreover, chatbots incur lower training and onboarding expenses for new employees, as there is less need for extensive training programs that are typically required for human staff. Additionally, chatbots minimize human error, which can lead to costly mistakes in customer interactions such as incorrect order processing or miscommunication. By ensuring consistency and accuracy in responses, chatbots contribute to a more reliable service experience, ultimately resulting in cost savings for businesses.

Figure 1. Structural Equation Modeling (SEM). Source: Prepared by the authors (2024)



Source: Prepared by the authors (2024)

In order to better understand the interdependence of factors and variables, an SEM analysis was performed. Looking at the graph (Figure 1) and table 3, you can see how certain factors and variables influence each other. Factor 3 “Organization of travel”

has a potentially negative impact on Factor 1 “Simplicity of travel”. Logically, because the simplified organization directly affects the simplification of the execution of tourist arrangements. Also, Factor 2 “Frequency of travel” can potentially negatively affect Factor 1 “Simplicity of travel”. Frequent trips that do not have quality content are directly proportional to the use of interactive maps. On the other hand, a large positive influence of the frequency of travel with money and free time can be observed. More money and more free time directly affects the frequency of tourist trips. In this connection, it is the chebots that help tourists to make faster decisions, and then to decide where and when to travel in accordance with their resources. All this confirmed the main hypothesis of the paper that the use of chatbots in agency business contributes to the sustainability of business because agencies keep up with the times and modern changes, which is reflected in the greater number of sold tourist arrangements and trips.

Table 3. Standardized Regression Weights:
(Group number 1 - Default model)

	Estimate
F1 <--- F3	-1,182
F1 <--- F2	-,617
v2 <--- F1	1,043
v4 <--- F1	,143
v7 <--- F1	,743
v8 <--- F2	2,218
v3 <--- F2	,257
v5 <--- F3	,068
v1 <--- F3	-,285

Source: Prepared by the authors (2024)

Table 4. Model fitting indicators

CFI	0,952
TLI	0,941
GFI	0,917
RMSEA	0,049
Chi-square	76,770

Source: Prepared by the authors (2024)

All of the model fitting indicators as shown in Table 4 indicates an acceptable fit. A RMSEA value of 0.049 (between 0.05 and 0.08) indicates a good fit. Higher values (>0.90) of CFI (0.952), TLI (0.941) and GFI (0.917) indicates a good fit. The Chi-square test shows that there are no significant statistical differences in the respondents’ answers

Conclusion

The integration of chatbots into sustainable travel agencies signifies a pivotal advancement in the travel industry, marrying technology with the imperative of ecological consciousness. By improving operational efficiency, enhancing customer experiences, and promoting sustainable practices, chatbots serve as vital tools in the quest for sustainable tourism. As travelers increasingly seek eco-friendly options and personalized experiences, the role of chatbots will continue to expand, ultimately leading to a more sustainable travel ecosystem. This synergy between AI technology and sustainable practices not only meets the demands of modern travelers but also contributes to the broader goal of protecting our planet for future generations. The future of travel lies in this harmonious blend, showcasing that innovation and sustainability can indeed coexist.

The integration of chatbots in the travel industry significantly enhances user experience by streamlining the booking process for flights and accommodations. Traditional booking methods often involve lengthy procedures, requiring users to navigate multiple websites or make phone calls to customer service representatives. Chatbots simplify this experience by allowing users to complete bookings through conversational interfaces, thus reducing friction and minimizing the time spent on travel arrangements. Furthermore, chatbots contribute to user satisfaction by drastically reducing wait times. Instead of placing a call and being placed on hold, users can receive immediate responses to their inquiries, which is especially critical during peak travel seasons when demand for support is higher. In addition to facilitating bookings, chatbots provide real-time updates and notifications regarding travel itineraries, such as flight delays or gate changes. This proactive communication ensures that travelers are well-informed, alleviating potential stress and enhancing their overall travel experience.

The paper showed that travelers are happy to use chatbots, that they help them to make travel decisions faster, easier and more efficiently. Also, chatbots save them money and time, making it possible for them to travel again. Therefore, chatbots are not a threat, but on the contrary, a powerful tool in the hands of tourism workers.

Despite the myriad benefits presented by chatbots in the travel industry, there are notable challenges and limitations that must be acknowledged. One primary limitation is their difficulty in understanding complex user queries, particularly those that require nuanced responses or involve multiple layers of information. For instance, a traveler seeking a multi-city itinerary with specific preferences may find that a chatbot struggles to provide satisfactory assistance, leading to frustration. Additionally, the reliance on technology introduces potential vulnerabilities, such as technical issues that may disrupt service or impair the chatbot's functionality. These challenges underscore the importance of balancing automation with the human touch in customer service interactions. While chatbots can handle routine inquiries and tasks, there remains a need for human agents to address more intricate issues and provide empathetic support. As the travel industry continues to evolve, the effective integration of chatbots will depend on the ability to harness their strengths while mitigating their limitations, ensuring that user needs are met holistically.

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ANALYZING USER EXPERIENCE FROM NEGATIVE REVIEWS: THE SALESFORCE CASE STADY

Abstract

The mobile business represents a rapidly growing market where user experience has a crucial role in sustaining the business. Its evaluation has gained interest, both in industry and academia, as it directly affects user satisfaction and loyalty, thus, competitiveness and company revenue. This paper aims to point to the reach of topic modeling in user experience evaluation. It is an effective approach to identifying aspects considered negative by mobile application users, relevant as a guideline for product improvement. The authors demonstrate this in the SalesForce mobile application case study using topic modeling to analyze 2.501 user reviews collected from the Google Play Store. Research results indicate key shortcomings of the application: compatibility, unreliability, slow loading, and excessive notifications. The research presents an innovative approach to user experience analysis and offers practical solutions for improving the SalesForce mobile business application.

Keywords: user experience, mobile business applications, SalesForce, topic modeling.

JEL classification: C38, M30, D83, C80

НЕГАТИВНЕ РЕЦЕНЗИЈЕ У АНАЛИЗИ КОРИСНИЧКОГ ИСКУСТВА: САЛЕСФОРЦЕ СТУДИЈА СЛУЧАЈА

Апстракт

Мобилно пословање представља тржиште које рапидно расте, где корисничко искуство игра кључну улогу у одржавању пословања. Његова евалуација је постала предмет интересовања како у индустрији, тако и у академским круговима, јер директно утиче на задовољство корисника, њихову лојалност, а самим тим и на конкурентност и приходе компаније.

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Овај рад има за циљ да укаже на ефикасност примене моделовања тема у процени корисничког искуства. Реч је о приступу који успешно идентификује аспекате које корисници мобилних апликација сматрају негативним, а који су релевантни као смернице за унапређење производа. Аутори то демонстрирају кроз студију случаја мобилне апликације СалесФорце, користећи моделовање тема за анализу 2.501 корисничких рецензија прикупљених са Гоогле Плау продавнице. Резултати истраживања указују на кључне недостатке апликације: некомпатибилност, непоузданост, споро учитавање и прекомеран број нотификација. Истраживање представља иновативан приступ анализи корисничког искуства и нуди практична решења за унапређење мобилне пословне апликације СалесФорце.

Кључне речи: *корисничко искуство, мобилне пословне апликације, СалесФорце, моделовање тема.*

Introduction

In today's digital age, where companies of all sizes increasingly strive to provide exceptional user experiences, analyzing user satisfaction becomes a key factor for success. Understanding the needs, preferences, and problems of users not only allows companies to offer personalized product and service recommendations but also to build long-term relationships with their users and nurture their loyalty, which ensures continuous and stable revenue for the company. In this context, user experience research becomes an imperative and a crucial strategic decision for companies aiming to stay competitive and achieve long-term market growth (Khan et al., 2015; Becker & Jaakkola, 2020).

The focus of this paper is on the mobile business applications market, which has become increasingly challenging in recent years due to its rapid growth, making competitiveness highly dependent on managing the user experience. Specifically, the goal of this research is to point to the reach of topic modeling in user experience evaluation. Topic modeling is a modern analytical approach, which has recently gained popularity and is increasingly being used in the domain of user experience analysis (Nguyen et al., 2023; Papadia et al., 2023; Park et al., 2018). It belongs to natural language processing (NLP) techniques and enables the automatic discovery of topics from a collection of texts. By applying topic modeling on a collection of online user reviews it becomes an effective approach to revealing user attitudes, desires, and complaints by identifying aspects considered negative by mobile application users. Negative aspects are particularly important as they indicate areas for product improvement. In this study, the authors demonstrate how topic modeling can be utilized to identify the primary negative aspects of user experience with the Salesforce mobile application. SalesForce is selected for the case study as it is the most widely used Customer Relationship Management (CRM) application, with a 21.7% market share in 2023 (Vailshery, 2024). SalesForce provides companies with access to various functionalities for effectively managing interactions with current and potential customers to establish long-term relationships and improve sales. Authors collected 9.308 online user reviews of the SalesForce mobile application from the Google Play store using the google-play-scraper Python library for

data scraping. Using the star ratings authors created a subset of reviews containing only those rated with one and two stars, leaving 2.501 reviews for further analysis. These are considered as negative reviews. After pre-processing the data through steps of cleaning, tokenization, and lemmatization, the Latent Dirichlet Allocation (LDA) topic modeling was applied to identify key topics in negative reviews.

Within the scope of the previously outlined research, the authors sought to answer the following research question using empirical findings:

RQ: Which aspects negatively influence SalesForce mobile application user experience?

The structure of the paper is divided into three main parts. By reviewing relevant literature, the first chapter provides an overview of relevant views on user experience, including the importance of user reviews and online evaluations in modern business. The second part describes the methodological steps of the research, from data collection to the application of topic modeling. The third part presents the research results, highlighting which aspects users are dissatisfied with when using the SalesForce mobile application. The conclusion summarizes the key findings of the research and provides recommendations for improving the SalesForce mobile application, as well as suggestions for future research in the field of user experience management.

User Experience Management

User experience management encompasses all the interactions of users with a company's products, services, and brands. This includes interactions with the user support team, as well. While user support and services represents the type of effort companies introduce in the crisis situations, in the sales process, during or after consumption of the product and service as a one-time action taken in response to a specific problem, user experience management encompasses every aspect of a user's interaction with the company, from the first contact to the departure (Fisher & Kordupleski, 2019).

User interactions with company, product, or a service may trigger different emotions and reactions. Some have positive responses, others may react negatively, depending on their predispositions (Oliver, 1997), which influence users to either continue loyalty to the company, switch products or services, or recommend their experience to others (Bravo et al., 2021). Berry et al. (2002) emphasize that if customers are to be satisfied, all the signals they get in the purchase process have to be carefully managed, whereas Gentile et al. (2007) supplement that user experience is a result of a sequence of interactions between the user and the product, company, or its parts, comprising rational, emotional, sensory, and physical responses to the service (Palmer, 2010).

Collection and analysis of user feedback should represent the foundation on which businesses decide on their user experience management strategy (Fisher & Kordupleski, 2019). User feedback analysis is crucial in defining the emotions, thoughts, and comments that lead users to make decisions on retention, switching to competitors, or recommending the product or service to others. Meyer and Schwager (2007) suggest user experience management approach based on monitoring past, present, and expected

trends. They identified three important behavioral patterns to which companies' attention should be paid: 1) past user behavior, 2) present user activities, and 3) user expectations of the future. For this purposes, data should be collected at every touch-point of interaction with the users, through surveys, interviews, focus groups, or online forums. Knowledge in all touch-points allows companies to assess user satisfaction and better understand its users' needs and desires, thus improve the overall user experience. Although assessment of user satisfaction is recognized as a crucial aspect of user experience (Chou & Chuang, 2018), many companies make mistake of designing user experience based on subjective perception rather than by incorporating user feedback into the products or services.

Traditionally, due to the limitation of time and technology, companies had to carry out either physical or online surveys using questionnaires to gain knowledge about user opinions, thoughts, emotions, attitudes, and feelings. Digital age and the rise of social media enabled users to share their experiences with products and services in real time. By sharing impressions through user-generated content on social media, i.e., photos and texts, future users' decisions are also affected and electronic word-of-mouth recommendation system among consumers is developed (Marić et al., 2022). Given this, the analysis of user opinion is recognized as increasingly important (Mirzaalian & Halpenny, 2019; Bu et al., 2021), while publicly available data, like online reviews, forum discussions, blogs, and posts from Facebook, Twitter, and other social networks, become important data sources of user opinions allowing companies to uncover nuances in user experience. Both large corporations and small-sized companies have recognized social media as a valuable resource for collecting and processing information about users, as well as placing marketing campaigns based on that information (Stefanović & Gardašević, 2024).

Topic Modeling in User Feedback Analysis

Topic modeling is a technique used for the identification of latent thematic structures, or "topics," within a set of textual data based on the present keywords. By grouping the keywords in topics, it indicates the most salient information conveyed within the text (Gluščević et al., 2024). Through topic modeling companies can discover sentiments and opinions shaping user behavior or experience, the interrelationships between topics, and monitoring of their evolution over time that points to potential trends. In this way, topic modeling identifies business areas that need improvements and provides insights for product development, marketing strategy, or user support (Gluščević et al., 2024). Bearing this in mind, topic modeling is an important technique for the analysis of user reviews. Instead going through every review manually, topic modeling will allow companies to automatically go through the reviews and categorize them according to the most prominent topics present in the documents. A method like this not only saves time and resources but helps businesses learn on a large scale, which otherwise might not have been possible with manual methods (Egger & Yu, 2022).

Recognizing new trends and recurring topics in user reviews contributes to understanding which product or service attributes contribute to positive and negative user perception. Such knowledge is helpful in decision-making processes, ranging from product development to improving user support and service. Additionally, the process

of monitoring and analysis of the sentiment of user reviews allows an organization to link the sentiment to a number of topics in order to identify exactly which aspects of the offer are valued positively or negatively by users. The results obtained can also be used to develop a priority list of areas for improvement or to highlight positive features in promotional campaigns (Papadia et al., 2023).

Research in topic modeling of user review collections has been steadily increasing over the last few years in many domains, such as health, education, social media, finance, with hospitality being particularly fertile. Among others authors, Park et al. (2018), Nguyen et al. (2023), Sutherland and Kiatkawsin (2020), Gregoriades et al. (2023), Taecharungroj (2023), and Zolfaghari & Choi (2023) used topic models as a core method to analyze the emotions and opinions of the user experiences in the tourism industry. To the best of our knowledge, topic modeling was not utilized as a tool for user experience evaluation of CRM mobile applications. Regardless of the domain of its application, topic modeling provides valuable insights that can help in the enhancement of user satisfaction and loyalty - the two most important aspects of business survival in the market.

Research Design and Methodology

The research methodology is focused on the analysis of user satisfaction with the SalesForce mobile application through a case study based on application of topic modeling over the collection of online reviews. Main objectives include assessing user perception of the SalesForce's quality, identifying shortcomings, and providing an insight into areas needing improvement. The reviews collected from Google Play Store will add value in terms of feedback that will enable the company to refine business strategies to accomplish user satisfaction. Methodologically, this involves:

- **Scraping reviews:** Data were scraped from the Google Play Store, including but not limited to review IDs, usernames, star ratings, and timestamps. A total of 9.308 reviews were collected.
- **Negative comments extraction**: Negative comments were identified and extracted from the collection using the Python library google-play-scraper, specifically focusing on online reviews with 1 and 2 star ratings. This case study is based solely on the analysis of this subset of data. After filtering, 2.501 reviews remained for analysis.
- **Data cleaning and preprocessing:** The reviews were prepared for analysis by changing text to lowercase, removing noise, such as punctuation and stopwords, and applying lemmatization for word reduction to root words.
- **Method selection:** *LDA* was deemed the most suitable method for uncovering hidden topics within the reviews, as it is the most widely used topic modeling technique for short-text analysis in academic research, particularly in the context of online reviews (Laureate et al., 2023). Laureate et al. (2023) demonstrated that 79.79% of studies focusing on short texts employ the LDA approach.
- **Selection of model with optimal number of topics:** Several experiments were carried out based on coherence measures for determining the optimal number of topics, such that the model captures relevant topics. The coherence

score was highest at 0.645 with 11 topics.

- **Results and discussion:** LDA modeling showed that compatibility, reliability, and notification overload were the main concerns of users in reviews.

These steps provided a structured approach to understanding user feedback and delivering actionable insights for improving SalesForce.

Research Results and Discussion

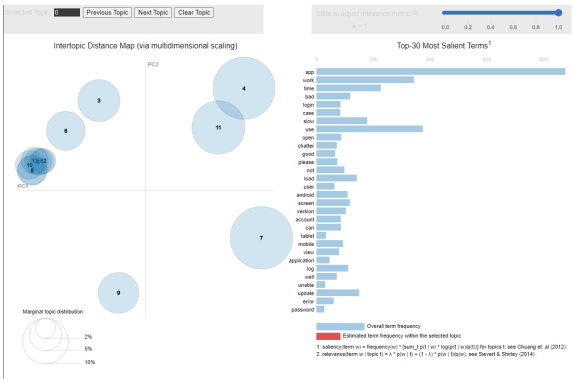
The discovered topics in negative reviews identify sources of user dissatisfaction with the SalesForce mobile application and potential sources of product improvement to enhance user satisfaction and experience. The analysis points to users often experiencing issues with the SalesForce's compatibility across different mobile devices, they find the SalesForce unreliable, loading time slow, consider the need for updates as frequent, and experience discomfort due to the high volume of notifications. Figure 1 illustrates resulting topics, their distribution, and dominant words within those topics. The following visualization has been created in Python using the pyLDAvis library.

Based on the keywords each resulting topic contains, the topics are interpreted as follows:

Topic 1: Issues in User Interaction and Functionality. This topic unveils issues that users have with basic functionalities, which most of the time are perceived as useless or redundant. Users have reported challenges in using such features.

Topic 2: Performance and Device Interactivity. This topic indicates that frustrations are caused by user incompatibility across all devices and responsiveness issues across device sizes such as desktop pc and mobile phones. The users also complain about issues with method of payment, logging out of the application, and poor user support.

Figure 1: *Visualization of topics in negative sentiment reviews using the pyLDAvis library*



Source: *Authors, 2024.*

Topic 3: Performance and Reliability Issues. Performance in this topic refers to data processing speed and data management. Several complaints have been made about frustrations due to system slowness and inability to maintain files easily, citing stability issues.

Topic 4: Issues about Functionality and Usability. The users' opinions are full of complaints about the page loading speed and too frequent application updates. Other issues include problems with production and compatibility on different devices, and navigation, uncaring and below expectations of users.

Topic 5: Performance of the notification system. It is the most frequent topic, 33.3% of the whole corpus. Users in these reviews often complain about not getting proper service, obtaining the required information, pointing to issues related to authentication and overall performance.

Topic 6: Frustrations with Interface and Dashboard. Users mention system ,problems, poor interface responsiveness when adding or loading user data, failure in proper information display on a dashboard. There are also complaints about the design and usability of the interface.

Topic 7: Quality of Service and Support. This topic speaks to dissatisfaction with service and support quality on the platform, including slow response time, inaccuracy in information, and improper functionality when offline.

Topic 8: Issues with Interface and Functionality. Concerns about reliability and performance continue, and problems keep recurring. People mention there is no interest in the SalesForce because of current interface and performance issues, which need attention.

Topic 9: Constant Instability and User Frustration. The topic includes frequent crashes, application freezes, and general complaints about user experience. Typical problems are errors that need reconfiguration very often, and users are forced to reinstall the application hoping to solve problems; thus, wasting time.

Topic 10: Installation and Compatibility Challenges. Users commonly complain about installation issues, especially with Android devices, and also report usability issues on older models. The issues of software updates also mount, and many have been driven to uninstall the Salesforce application. The installation process has often been cited as too complicated and in need of simplification, especially for Android users.

Topic 11: Authentication problems. This topic comprises issues of account access and problems during the login process, which eventually result in blank screens. Some users even reported receiving error messages and further inability to get past the login screen.

Application users also tend to express frustration and dissatisfaction in reviews using words with negative sentiment. Some of the critical keywords related to performance are *slow*, *crash*, *bug*, and *freeze*; keywords related to inability to run the application are *useless*, *unacceptable*, and *unusable*; and keywords related to degraded user experience are *error*, *crash*, and *constantly*. Expressions of dissatisfaction regarding

the user interface and user support are present as well. They are reflected by terms such as *poor*, *inconsistent*, and *support*.

Reviews reveal some dissatisfaction related to the authentication process and security features of the SalesForce. This is evidenced by the use of *password* words like *login*, *password*, and *security*. Users are upset because of SalesForce updates and installations; *update*, *install*, *version* are frequent terms in reviews. Such reviews hint strongly at performance and functionality issues, which are substantially factored into user experience and overall satisfaction. Negative feedback often reflects deep frustration that there is a disconnection between user expectation and the actual performance of the SalesForce, showcasing an area of needed improvement in design and functionality to enhance the user's experience.

Conclusion

Given the increasing importance of digital solution, understanding and working upon improvement of user experience is the key to any application's success, which includes mobile platforms like SalesForce. This study, based on the application of topic modeling techniques on a large dataset of user reviews, has revealed some major negative concerns related to the SalesForce mobile application. Issues pertain to compatibility problems, application unreliability, slow performance, and excessive notifications. These are very important concerns to address because they will further enhance the user experience and improve their loyalty. They represent a valuable feedback that SalesForce company can use to identify specific areas of improvement. It will enable them to satisfy user expectations more successfully, making the application much stronger and secure. The results of the case study point toward the importance of leveraging user feedback for driving product development. This way, it can help resolve current issues and predict or avoid any potential ones. SalesForce is able to consolidate a better position in the market and build a much better experience for its users in terms of continuing business and user retention.

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ECONOMIC FREEDOM AND FOREIGN DIRECT INVESTMENT: NEW GLOBAL OVERWIEW

Abstract

This paper investigates the connection and impact of economic freedom, measured by the index of economic freedom, on the inflow of foreign direct investments in developing countries. The research problem is sublimated by the question of whether variations in economic freedom affect the inflow of foreign direct investments. The panel analysis was conducted on a sample of 40 developing countries in the period 2005-2023. The research results showed that 8 components of the Economic Freedom Index have a statistically significant impact on foreign direct investment inflows, while the impact of the 2 components is irrelevant. In this way, the research hypothesis was confirmed that the higher degree of economic freedom has a significant and positive impact on the inflow of foreign direct investments ceteris paribus. The contribution of the research is reflected in the wide geographical and temporal scope, as well as the choice of analytical tool, in order to obtain conclusions with a higher degree of accuracy and reliability.

Keywords: *Index of Economic Freedom, Foreign Direct Investments, Developing Countries, Panel Analysis*

JEL classification: *F21, K20, O50.*

ЕКОНОМСКЕ СЛОБОДЕ И СТРАНЕ ДИРЕКТНЕ ИНВЕСТИЦИЈЕ: НОВИ ГЛОБАЛНИ ПРЕГЛЕД

Апстракт

У овом раду истражује се веза и утицај економских слобода, мјерених индексом економских слобода, на прилив страних директних инвестиција у земље у развоју. Проблем истраживања сублимиран је питањем да ли варијације економских слобода утичу на прилив страних директних инвестиција. Панел анализа спроведена је на узорку од 40 земља у развојуу периоду 2005-2023. године. Резултати истраживања показали су да 8

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компоненти индекса економских слобода имају статистички значајан утицај на прилив страних директних инвестиција, док је утицај 2 компоненте ирелевантан. На тај начин потврђена је истраживачка хипотеза, да виши степен економских слобода има значајан и позитиван утицај на прилив страних директних инвестиција цетерис парибус. Допринос истраживања огледа се у ширем географском и временском обухвату, као и избором аналитичког алата, како би се добили закључци са већим степеном тачности у поузданости.

Кључне ријечи: *индекс економских слобода, стране директне инвестиције, земље у развоју, панел анализа*

Introduction

Economic freedom represents the freedom of individuals and companies to act freely on the market. That is, freedom of choice in all aspects of business activities, without large and unnecessary government interference in their activities. Key aspects of the economic and entrepreneurial environment are subject to political control, and they relate to aspects of the legislative, institutional and regulatory environment. The rule of law, the size of government and administrative capacities, regulatory efficiency and market openness are significant predictors of an effective and efficient economic environment, which have a stimulating effect on the entrepreneurial spirit and the movement of capital.

This paper examines the connection between the aforementioned assumptions of a successful economic environment and international capital flows, in the form of foreign direct investments. By examining the mentioned connection, the research will provide an answer to the problem question, do the variations of economic freedom have an impact on the inflow of foreign direct investments? The subject of the analysis refers to 40 developing countries in a 2005-2023 period. The index of economic freedom was taken as a representative indicator of the independent variable. By analyzing ten components of the index of economic freedom, the aim will be to obtain results with a higher degree of accuracy, reliability and relevance regarding the relationship and impact of the dependent variable on the independent variable.

In this way, the research hypothesis will be tested, that the higher degree of economic freedom has a significant and positive impact on the inflow of foreign direct investments *ceteris paribus*. After the introductory considerations, the first part gives an overview of the research, that is, a theoretical and cross-sectional section of relevant studies. The second part of the paper refers to the determination of research methods and data used in the analysis. In the third part, the results of the analysis are presented and the results of the research are compared with similar and/or comparable studies. In the fourth part, concluding considerations are given.

Review of relevant studies

The two most important indicators used to measure the degree of economic freedom are the Economic Freedom of the World (EFW), published by the Fraser Institute, and The Index of Economic Freedom (hereinafter IEF), published by the Heritage Foundation. This paper will analyze the role and importance of IEF in the inflow of foreign direct investments (hereinafter FDI). Quazi (2007), analyzing the role of economic freedom in the inflow of international capital, based on a sample of East Asian countries, determined that increased economic freedom, measured by IEF, represents a significant and strong determinant of FDI inflow. The results of the analysis of Caetano & Caleiro (2007) show the existence of a positive relationship between economic freedom (measured by IEF) and FDI inflows in MENA countries, and that the relationship is stronger with the growth of economic freedom.

Haydaroğlu (2016), as well, established the existence of a positive and significant relationship between economic freedom and FDI inflows to BRICS countries. By analyzing the five components that make up IEF, it was determined that four components (except government size) have a positive effect on the inflow of FDI and economic growth. A panel analysis of 79 developing countries by Hossain (2016) showed that economic freedom (measured by IEF) is a positive determinant of FDI inflows. Another panel analysis by Imtiaz & Bashir (2017), on a sample of five South Asian countries, came to the conclusion that economic freedom is an important factor influencing the inflow of FDI. Also, the analysis found that fiscal and trade freedom (in IEF structure) have the statistically most significant influence on the inflow of FDI.

A panel analysis by Bengoa & Sanchez-Robles (2003), on a sample of 18 Latin American countries, showed the existence of a significant and positive relationship between economic freedom and FDI, and that economic freedom represents a positive determinant of FDI inflows. The analysis of Azman-Saini, Baharumshah & Law (2010) also confirmed the existence of a positive relationship between economic freedom and FDI inflows, and that countries with a greater degree of economic freedom generate greater benefits from the presence of multinational companies. Sulliman & Mollick (2009) emphasize, among other factors, the significance of economic freedom as an important factor in the inflow of FDI in the countries of Sub-Saharan Africa. The positive and significant influence of economic freedom, in addition to institutional development and trade liberalization, on the inflow of FDI in the countries of Central and Eastern Europe was also confirmed in the analysis of Tintin (2013).

Research by Iamsiraroj (2016) showed that economic freedom, trade openness and labor availability are key determinants of FDI inflows in analyzed 123 countries. Also, other studies (Zghidi, Mohamed Sghaier & Abida 2016; Badri & Sheshgelanib, 2017; Dkhili & Dhiab, 2018; Sofuoglu, Kizilkaya & Uyusal, 2019; Štilić, A., Mastilo, Vuković & Mastilo D., 2023; Shikur, 2024) confirmed the existence of a statistically significant and positive relationship between economic freedom and FDI inflows, and that economic freedom is a significant predictor of FDI inflows. The research of Subasat & Bellos (2011), based on the analysis of 7 factors of IEF, showed that only the trade freedom indicator has a significant and positive impact on the inflow of FDI, two indicators (government spending and fiscal freedom) have a negative impact and 4 indicators have an insignificant impact. Mehrara & Zirak (2013), analyzing 123 developing countries,

concluded that the impact of economic freedom (based on 10 indicators of IEF) is different. Only 23 countries, thanks to an adequate and efficient economic policy, were successful in attracting FDI. The panel analysis conducted by Moussa, Çaha & Karagöz (2016) of 156 countries showed that the impact of economic freedom (measured by IEF) positively affects FDI inflows, but there is a degree of heterogeneity in different regions. The effect and impact is most pronounced in European countries and the least pronounced in the countries of Oceania and fragile-conflict affected countries.

The analysis of Ţaran, Mironiuc & Huian (2016) came to the conclusion that economic freedom, measured by IEF, is a significant factor in the inflow of FDI. However, only the indicators of fiscal, financial, monetary and trade freedom and government consumption have a statistically significant influence, and the influence of other indicators on the inflow of FDI is irrelevant. Also, the analysis of Sooreea-Bheemul, Rasool & Sooreea (2020) show that higher economic freedom is a key determinant of FDI inward in Sub-Saharan Africa. The analysis of the IEF component has shown that business, labor, monetary and fiscal freedom, market and trade openness and market size are key determinants in attracting FDI while fiscal and investment freedom are less important. Research by Ullah & Khann (2017) analyzed the determinants of FDI inflows in SAARC and ASEAN countries, as well as Central Asian countries. The heterogeneity of the obtained results implies the existence of the influence of various factors that make up IEF. The Index of economic freedom has a positive and significant impact on FDI inflows to SAARC countries. In the countries of Central Asia the effect of IEF on the inflow of FDI is negative and not statistically significant. Unlike the two regions mentioned, institutional factors play a positive role in attracting FDI to ASEAN countries.

A study by Singh & Gal (2020) investigated the determinants of FDI inflows in nine regions, at the global level. The results of the study showed that economic freedom, measured by the IEF, has a significant and positive influence on the inflow of FDI in the countries of South and East Asia, Northern and Western Europe and Latin America, and an insignificant influence in the countries of the Middle East, North Africa, and Southern Europe. A study by Lim (2001) identified key determinants that significantly affect FDI inflows, and are related to economic and political stability, trade openness, fiscal incentives and a stimulating business and investment climate.

Other studies (Harms & Ursprung, 2002; Hailu, 2010) emphasized the importance of the openness of the national economy and the existence of political stability as factors that statistically significantly and positively influence the inflow of FDI. The analysis of Demekas, Horváth, Ribakova & Wu (2005) showed that the liberalization of trade, the development of the institutional and infrastructural framework and an adequate tax policy significantly influence the inflow of FDI. Also, other relevant studies (Globerman & Shapiro, 2003; Onyeiwu & Shrestha, 2004; Bénassy-Quéré, Coupet & Mayer, 2005; Kim, 2010; Adams & Opoku, 2015; Malikane & Chitambara, 2017, Aziz, 2020; Tag & Degirmen, 2022; Kwablah & Amoah, 2022) reached similar conclusions, that is, that the openness of the national economy, well-developed financial markets, monetary stability, the development of the institutional and regulatory framework, the quality of institutions, an adequate tax system, the conditions for starting a business, rule of law and reduced corruption represent fundamental factors that statistically significantly and positively affect the inflow of FDI.

Methodology and data

The subject of the research is the analysis of the connection and impact of economic freedom on the inflow of FDI. The aim of the research is to test the existence of a connection and determinism between economic freedom and FDI. The dependent variable in the research is foreign direct investments, and the quantitative indicator of the variable is the value of FDI inflows in analyzed countries. The independent variable in the research is economic freedom and the quantitative indicator is the index of economic freedom. The index of economic freedom is focused on quantifying key aspects of the economic and business environment over which governments have control: *Rule of law*, *Government size*, *Regulatory efficiency*, and *Market openness*. The index of economic freedom measures 12 components from the aforementioned four categories, ranked on a scale of 0-100.

The index of economic freedom, which measures the degree of economic freedom since 1995, classifies 184 countries into 5 categories, from repressive to free (Heritage Foundation, 2024). The first four places in the ranking for 2023. are occupied by Singapore, Switzerland, Ireland and Taiwan, and these countries are in the category *free* (score of 80 or more), 22 countries are in the category *mostly free* (70-79.9), 55 countries are in the category *moderately free* (60-69.9), 62 countries are in the category *mostly unfree* (50- 59.9) and 33 countries are in the category *repressed* (0-49.9) (Heritage Foundation, 2024). The paper analyzed 10 components of IEF, that were shown in Table 1 (*Government Integrity, Government Spending, Tax Burden, Property Rights, Monetary Freedom, Business Freedom, Investment Freedom, Labor Freedom, Financial Freedom* and *Trade Freedom*). Two components (*Judicial Effectiveness* and *Fiscal Health*) were omitted from the analysis due to the lack of data for the targeted time period.

The research was conducted on a sample of 40 developing countries from Asia (China, Cambodia, Lao People's Democratic Republic, Malaysia, Philippines, Viet Nam, Bangladesh, India, Pakistan, Sri Lanka), Africa (Egypt, Morocco, Tunisia, Cameroon, Ethiopia, Kenya, South Africa, Côte d'Ivoire, Ghana, Nigeria), Middle East (Iran, Bahrain, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Turkey, United Arab Emirates), and Latin America (Argentina, Brazil, Columbia, Ecuador, Paraguay, Uruguay, Costa Rica, Honduras, Mexico and Dominican Republic), according to the M49 classification of the United Nations (United Nations, 2022).

Table 1: The value of 10 components of the index of economic freedom

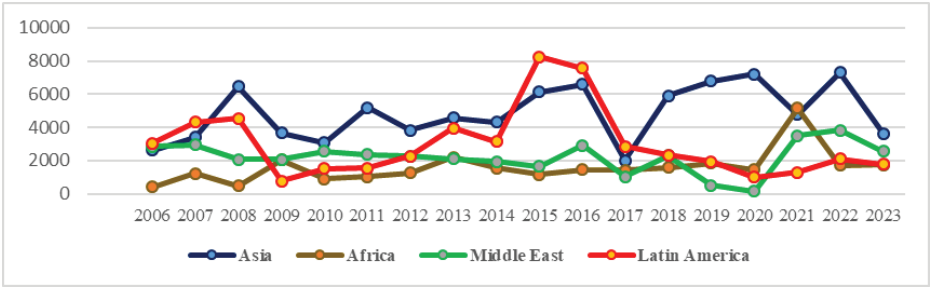
	Property Rights	Government Integrity	Tax Burden	Government Spending	Business Freedom	Labor Freedom	Monetary Freedom	Trade Freedom	Investment Freedom	Financial Freedom
2005	39.5	34.0	80.1	75.8	61.0	59.9	75.4	62.4	44.0	41.8
2006	39.5	33.7	80.1	76.3	58.7	59.4	75.9	63.5	43.5	46.0
2007	38.3	35.3	81.1	78.1	59.6	59.3	74.3	58.1	43.3	45.5
2008	38.8	34.9	81.7	79.1	61.2	59.3	73.1	69.0	43.0	44.5
2009	37.5	34.5	81.3	78.5	63.7	59.6	72.5	71.5	43.3	46.0
2010	38.8	35.5	82.3	78.4	63.1	60.3	69.3	73.1	45.0	46.0
2011	38.9	35.2	82.3	78.1	63.3	59.3	72.1	73.6	47.9	46.0
2012	38.1	35.5	82.4	74.0	64.1	60.1	73.1	72.7	47.6	46.0

2013	38.0	35.3	82.7	74.9	63.1	58.6	72.5	72.3	48.6	46.5
2014	37.9	34.7	82.9	75.2	62.9	59.0	72.4	72.2	50.6	47.0
2015	37.5	38.0	82.7	74.5	61.5	59.1	72.9	72.6	50.2	47.2
2016	37.0	38.8	82.7	74.3	62.9	57.8	72.8	73.5	52.3	47.5
2017	51.1	37.6	82.6	73.7	62.5	56.9	74.4	74.6	53.2	47.8
2018	49.5	37.9	82.4	73.6	62.6	55.8	74.5	74.8	54.6	48.2
2019	50.7	38.0	82.4	73.8	61.8	57.0	73.9	73.7	54.5	48.3
2020	55.5	39.9	82.2	74.9	62.4	56.6	72.9	73.2	54.6	48.5
2021	53.7	41.9	81.9	75.5	63.7	56.9	73.2	70.1	54.9	48.5
2022	48.1	38.8	82.4	74.2	60.3	56.6	71.8	69.4	54.9	48.8
2023	47.6	38.4	81.1	74.9	60.8	53.3	70.5	69.6	54.0	48.0

Source: Author`s calculation based on Heritage Foundation (2024)

The time period of observation is 2005-2023 for the value of IEF and 2006-2023 for the inflow of FDI (Graph 1). A time lag of one year represents the construction, the impact of the independent on the dependent variable would be tested only when it starts to generate effects. Although the value of IEF has been calculated since 1995, there are no values for all components for the analyzed developing countries in the period 1995-2023, so 2005 was chosen as the base year, from which there is comprehensive data on the value of the components.

Graph 1: *FDI Inflow in analyzed countries, in four geographic region, in millions USD*



Source: Author`s calculation based on UNCTAD (2024)

Statistical data for the value of the dependent variable were taken from the databases of the United Nations Conference on Trade and Development (UNCTAD), and for the value of the independent variable from the databases of The Heritage Foundation.

Research results and discussion

The analysis of the collected data was performed using the Panel data model it the statistical tool SPSS. Data processing was performed on the basis of statistical software for social sciences – SPSS, v. 23. Three models were constructed: A model without predictors, The fixed effects model, and The random effects model. Based on

the calculated Intraclass Correlation Coefficient for all models, the fixed effects model was chosen, where the ICC value implies that 99.9% of the total variability represents the variability 8 from 10 indicators of IEF as an independent variable, that is, that 99.9% of the variability can be explained by the presence of 8 analyzed indicators as an independent variable. Based on the formula for calculating the Intraclass Correlation Coefficient, the value in the model with fixed predictors was calculated.

$$ICC = \frac{Variability\ Between\ Groups}{Variability\ Between\ Groups + Variability\ Within\ Groups} \cdot 100 \qquad (1)$$

$$ICC = \frac{1.21 \cdot 10^{19}}{1.21 \cdot 10^{19} + 1.72 \cdot 10^{18}} \cdot 100 = 99.9\% \qquad (2)$$

The fixed effects model shows the maximum amount of clustering. The calculated values, which were shown in Table 2, imply that the specified weighting values of IEF have an impact on the inflow of FDI in the analyzed developing countries, that is:

$$FDI_{(n)} = Property\ Rights\ (n-1) + Government\ Integrity\ (n-1) + Tax\ Burden\ (n-1) + Government\ Spending\ (n-1) + Business\ Freedom\ (n-1) + Labor\ Freedom\ (n-1) + Monetary\ Freedom\ (n-1) + Trade\ Freedom\ (n-1) + Investment\ Freedom\ (n-1) + Financial\ Freedom\ (n-1) \qquad (3)$$

Table 2: *Estimates of Fixed Effects*

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	3,115743E-11	.	.	.	.	.	.
Property Rights	425781,10	303022,62	9,915	1,405	,191	-250177,28	1101739,48
Government Integrity	45571,35	417289,16	10,980	,109	,915	-873076,28	964218,98
Tax Burden	117628,67	126075,34	10,507	,933	,372	-161458,71	396716,06
Government Spending	-263228,53	156238,31	10,477	-1,685	,122	-609212,68	82755,63
Business Freedom	266407,43	184765,48	10,702	1,442	,178	-141645,19	674460,06
Labor Freedom	209037,27	316079,61	10,942	,661	,522	-487102,08	905176,61
Monetary Freedom	9252,77	135118,79	10,226	,068	,947	-290910,94	309416,48
Trade freedom	-63435,60	136030,57	10,040	-,466	,651	-366367,31	239496,11
Investment Freedom	-2,135780E-7	.	.	.	.	.	.
Financial Freedom	-5,110449E-9	.	.	.	.	.	.

Source: Author's calculation in SPSS

After including the covariance parameters, the following model was defined:

FDI = 425781,1005 * *Property Rights* (± 303022,6179) + 45571,34812 * *Government Integrity* (±417289,1655) + 117628,6704 * *Tax burden* (± 126075,3452) – 263228,528 * *Government Spending* (± 156238,3128) + 266407,434 * *Business Freedom* (± 184765,4805) + 209037,2656 * *Labor Freedom* (± 316079,6107) + 9252,768505 * *Monetary Freedom* (± 316079,6107) – 63435,604 * *Trade Freedom*

(± 135118,7852) – 0,000000213578 * *Investment Freedom*
(± 136030,5696) – 0,000000005110449 * *Financial Freedom* (4)

In the fixed effects model, the obtained value implies that 99.9% of the variability of FDI is explained by the variations of the *Property Rights, Government Integrity*, *Tax Burden*, *Government Spending*, *Business Freedom*, *Labor Freedom*, *Monetary Freedom* and *Trade Freedom* indicators. The stated values imply that an increase in economic freedom, in terms of the development and improvement of the legislative, institutional, and regulatory framework, has a significant impact on FDI inflows in the analyzed countries. In other words, ensuring property rights protection, improving government integrity, increasing tax burden and government spending, and enhancing business, labor, monetary, and trade freedom are predictors that positively stimulate FDI inflows in the analyzed countries. The impact of indicators *Investment Freedom and Financial Freedom* is not statistically significant and does not significantly affect the variations of the dependent variable due to the obtained values of the coefficients in the model.

The results obtained in the analysis confirmed the existence of a connection and impact between economic freedom and the inflow of FDI in the developing countries that are the subject of the analysis. The analysis targeted eight indicators of the independent variable that have a statistically significant impact on the indicator of the dependent variable. Decomposing IEF into 10 components identified 8 components, i.e. indicators that have a statistically significant impact on the inflow of FDI into the analyzed developing countries. Other two components of IEF also have an impact on the dependent variable, but this impact is not at a statistically significant level. The above implies the existence of heterogeneity of the impact of the 10 components of IEF on the inflow of FDI. A positive sign in the model implies the existence of a positive relationship between the value of the IEF and the inflow of FDI. The cumulative value 8 of 10 components sublimated in IEF has an impact on the inflow of FDI, which means that an increase in the degree of economic freedom has a statistically significant and positive effect on the inflow of FDI in the analyzed developing countries.

The results of similar and comparable research also show a significant degree of heterogeneity and differentiation in terms of the impact of the analyzed components of IEF and the cumulative value of IEF on the inflow of FDI. The results of the panel analysis of Bengoa & Sanchez-Robles (2003) show the existence of a statistically significant and positive impact of IEF on the inflow of FDI. Also, research by Quazi (2007), Caetano & Caleiro (2007), and Hossain (2016) proved that the increase in the value of IEF is a significant predictor of the inflows of FDI. Other studies prove the existence of a certain degree of differentiation of the impact of the components of IEF on FDI flows. Analyzes by Subsat & Bellos (2011), Mehrara & Zirak (2013), Moussa, Çaha, & Karagöz (2016), Ţaran, Mironiuc & Huian (2016), Haydaroğlu (2016), Imaztiaz & Bashir (2017), Ullah & Khann (2017), Singh & Gall (2020), Aziz (2020), Sooreea-Bheemul et al. (2020), Tag & Digirmen (2022), Štilić et al. (2023) came to the conclusion that certain components have a statistically significant impact on the inflow of FDI, and the degree of heterogeneity is present in all the mentioned studies.

There are no uniform impacts of certain components of IEF, but the differentiation depends on the degree of development of the analyzed developing countries, the geographical scope of the research and the time period of observation. The results

obtained in the research are compatible with the majority of comparable studies, in the aspect of analyzing the cumulative value of IEF, while the values of the analyzed 10 components of IEF, collectively or individually, are to a certain extent similar to the mentioned studies.

Conclusion

This paper investigates the impact and role of economic freedom in international capital flows at the global level. The research aimed to provide an answer with the highest possible degree of accuracy, objectivity and representativeness to the research problem, which is covered by the question of whether variations in economic freedom have an impact on the inflow of foreign direct investments. As a representative indicator of the degree of economic freedom, IEF was taken, which sublimates 12 integrative components that tend to include factors that have an impact on international dil trade and financial flows. The limitation in the research refers to the impossibility of incorporating all 12 components of the Index into the model due to the lack of data for the analyzed countries in the period since the beginning of index measurement (1995). In other words, the Heritage Foundation databases do not contain complete indicators of the IEF components for the analyzed countries concerning the time frame of the analysis.

The analysis tested the impact of IEF on the inflow of FDI. The time period of observation included 18 years for IEF and 17 years for FDI. The time lag of one year for the value of FDI refers to the logical assumption that the impact of the independent variable on the dependent variable shows its effects only after a minimum of one year has passed. The geographical coverage of the research represents the analysis of 40 developing countries, according to the M49 United Nations classification. A panel data model was used as an analytical tool. Three models were constructed and based on the obtained parameters, the fixed effects model was selected. The direct implication of the analysis is the identification of eight indicators that have a statistically significant impact on the variations of the dependent variable.

The first approximation of the analysis is that IEF has a statistically significant and positive impact on the inflow of FDI in the analyzed developing countries. This means that positive variations in IEF, i.e. an increase in economic freedom, have a stimulating impact on the inflow of FDI. The second approximation of the analysis represents the targeting eight of ten components of IEF that have a statistically significant impact on the inflow of FDI. In this way, the research hypothesis was proven, which represents the construction that the higher degree of economic freedom has a significant and positive impact on the inflow of foreign direct investments ceteris paribus.

This research represents a good starting point for future studies of the aforementioned relationships. The conclusions reached in the analysis are temporary and fragile and are based on imperfect research that will be expanded and supplemented in the future. New insights can be obtained by using a larger temporal and geographical coverage, in accordance with the available statistical data, in order to obtain results with a greater degree of accuracy and objectivity, *ceteris paribus.* In terms of the geographical criterion, the aforementioned implies the inclusion of a larger number of developing countries in the analysis, while the extension of the research timeframe depends on the

updating of databases for the values of the dependent and independent variables, which were not fully available at the time of the analysis in this paper.

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MANAGERIAL AND APPLICATION ISSUES IN BIG DATA ANALYTICS

Abstract

Considering the fact that the importance of big data has been growing in the last few years, experts are considering the ways and means by which the changes brought by new technologies can be implemented in the company's operations. An increasing number of companies are focused on investments in big data analytics, with the aim of learning from it important lessons that can later provide them with a competitive advantage. Until now, the emphasis was on the technical aspects of this data, and special attention was paid to organizational changes and the ways in which big data should be used. As with any innovative technology, it is very important to understand the mechanisms and processes through which big data can add value to businesses, and it is also important to have a clear picture of the different elements of this technology and their interdependencies. This paper aims to present the latest trends in big data analytics, as well as the potential of this technology in the future. In addition, a brief overview of big data analytics tools and the domains in which they can be applied is given.

Key words*: Big data analytics, Domains of application, Big data tools, Managerial issues*

JEL classification: M15, L86

УПРАВЉАЧКА И АПЛИКАТИВНА ПИТАЊА У АНАЛИТИЦИ ВЕЛИКИХ ПОДАТАКА

Апстракт

С обзиром на чињеницу да значај великих података расте у последњих неколико година, стручњаци разматрају начине и средства помоћу којих се промене које нове технологије доносе могу имплементирати у пословање предузећа. Све већи број предузећа је фокусиран на улагања у аналитику великих података, са циљем да из тога изуку важне поуке које им касније могу обезбедити конкурентску предност. До данас, нагласак је био на техничким аспектима ових података, а посебна пажња је била посвећена организационим променама и начинима на које велике податке треба искористити. Као и код сваке иновативне технологије,

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веома је важно разумети механизме и процесе путем којих велики подаци могу додати вредност предузећима, а такође је важно и имати јасну слику о различитим елементима ове технологије и њиховим међузависностима. Овај рад има за циљ да прикаже најновије трендове у аналитици великих података, као и потенцијал ове технологије у будућности. Осим тога, даје се кратак преглед алата за аналитику великих података и домена у којима се могу применити.

***Кључне речи: а**налитика великих података, домени примене, алати великих података, управљачка питања*

Introduction

The use and management of big data in organizations when making decisions is attracting more and more attention, both in theoretical analysis and in practical application. An increasing number of companies are investing in this technology in order to better analyze big data and to take advantage it provides. Today, big data is analyzed and used not only in the field of informatics and information systems, but also in management and other social sciences. In addition, big data can be used in the media and journalism to personalize the content that is marketed, while in the oil and gas industry it can be used for risk assessment.

Given that big data is a relatively new technological paradigm, there are few researches on how to effectively manage it, and therefore there is a lack of theoretical research on the topic of using big data to gain a competitive advantage for companies. Today, in modern business conditions, the use of big data analytics will represent the difference between companies, which will provide advantages and success to companies that know and use it, while companies that are traditionally oriented and do not want to use it or have no experience or knowledge will not achieve market success. (Micallef et al., 2018).

In the first part of the paper, the concept of big data is defined and the importance of the analysis of this data for business operations is indicated. A brief overview of the traditional way of managing big data will be made, after which the modern way will be pointed out and a parallel between the two methods will be established. In addition, attention will be focused on the classification of big data analytics according to which there are the following categories of analytics: diagnostic, descriptive, predictive and prescriptive analytics.

In the second and third part of the paper, the advantages, but also obstacles and challenges in the implementation and use of big data analytics will be analyzed. This implementation is based on the use of various technologies and tools that are the basis of big data analytics, so here we will have a brief overview of them.

In the fourth part of the paper, the possibility of applying big data analytics in different domains, sectors and industries will be pointed out. Although very mention of big data analytics primarily refers to its use within the IT industry, today it is widely applied in healthcare, the chemical industry, but also in higher education and science in general. Different companies, depending on the industry, use different tools and give them primacy in a certain period of time.

Definition and classification of big data analytics

Big data analytics is the process of collection, examination and analysis of the data, in order to obtain information about market trends, consumer demands, etc. Based on the data that is collected and analyzed, companies make decisions. At the same time, artificial intelligence is a very important tool that serves to adequately take data, which is unstructured or structured, from different sources and compose them into wholes.

Through big data analytics, businesses are enabled to improve and optimize their operations. These analytics also enable businesses to reduce costs, but also to provide better products to consumers, thereby inducing repeat purchases, as well as gaining a good reputation. Big data analytics was especially important during the Covid-19 pandemic, when it provided the governments of different countries with information on how to promote the need for vaccination, as well as for predictions about further solutions to contain the pandemic. (Sheng et al., 2021)

Big data analytics is a relatively new concept. However, if we look back into the past, we can see that during the 1950s, there was also some kind of simplified, basic analytics through manual analysis of numbers in tables. Back then, data was used and analyzed to make decisions in the future, while now, big data analytics, characterized by high speed and efficiency, allows data to be used to make immediate decisions.

The process of analyzing large amounts of different data sets using advanced analytical techniques is called big data analytics. Big data, in the terminological sense, represents data sets whose size or type exceed the ability to manage them in a traditional way. (Gupta & George, 2016)

Big data contains great variety, arrives in great quantities, at great velocity. When it comes to size as a characteristic of this data, it is a large amount of mostly unstructured data of low density. Velocity, as another characteristic, refers to the high speed of receiving data within the company. The data is received instantly, in real time, which enables immediate decisions to be made, rather than decisions for a future period of time. Thirdly, the large variety of data arriving in different forms (through tables, text, video or audio recording) complicates the analysis process, but also provides greater relevance and comprehensiveness. New technological solutions have exponentially reduced the costs of storing and managing data, which enables more precise and accurate decisions to be made.

The process of managing big data involves passing through three stages:

- Integrating data (big data is combined from different sources, after which it is entered, processed and formatted, where it is necessary to pay attention to the forms that business analysts in the company know and use),
- Organizing and storing data (the obtained data must be to be stored in the form in which bussines analysts judge that it is currently the best),
- Data analysis (the purpose of the collected data is to analyze it, in order to determine the best decision that can be made based on it and what needs to be corrected or improved).

The difference between traditional data and big data is not, as it might seem, only in size. There is no limit or point from which it is said that up to that certain data is of small amount, and thereafter of large amount. Since ancient times, man has processed

some data that served him to make decisions. However, today's data is in different formats, from different sources, and its volume is growing rapidly, so that traditional tools and approaches cannot be used to process it. Also, modern big data implies large sets of data, the analysis of which can solve major problems of companies, which was not possible with traditional data. Goals, tools, processes and plans are different today.

Big data is used to reveal trends and future movements in the market, on the basis of which the company's operations are directed. The more attention is paid to investing in technology for processing big data and its analytics, the deeper the search of big data, the more likely it is that good decisions will be made based on it and that the business of company will be directed in the right way. (Fan et al., 2021).

When it comes to the characteristics that distinguish traditional from modern data, the **first** and most striking is flexibility. The database of traditional data is fixed and static. It supported only structured data, which is a big obstacle in modern conditions, because most of the data is of an unstructured nature. Therefore, there was a need for a mechanism that supports the processing of unstructured data, using new methods for control and storage. (Mohamed et al., 2020)

Another difference relates to the time of analysis of the collected data. In the past, analysis was done only after all the data was collected and used to make future decisions, thus limiting progress in all areas in which it is used. In contrast, today data is processed in real time, which provides an opportunity for the advancement of medicine, biotechnology and the whole science in general.

The **third** difference relates to architecture. Traditional data was based on a centralized architecture, unlike today's, which is based on a distributed architecture.

The fourth, the difference is noticeable in the number of sources from which data is collected. A limited number of sources today has turned into an unlimited and infinite number of sources from which data is collected.

The fifth, there is a difference in approach. With traditional data, the questions to which the analysts wanted to get answers were defined at the beginning, in contrast to the modern way of processing big data where the approach is exploratory. New questions are created daily, resulting in a greater volume of useful data and conclusions. Modern technological platforms are continuously developed and enable better processing.

In theory, there are a large number of classifications of big data analytics depending on different authors, criteria for classification, etc. Most often, big data analytics can be grouped into four basic types:

Diagnostic analytics. This type of analytics is the latest way to manage big data in modern business. Based on the data that has been collected and already realized situations, the analysis focuses on discovering the causes of the occurrence of a certain situation. As an example, we can take a drop in sales in a certain time interval. Diagnostic analytics makes it possible to find out with the help of big data what contributed to the decline in sales, assuming that there were no marketing efforts that the company changed. The situation is the same with the growth of sales, where it is analyzed and diagnosed what led to the increase in sales in order to continue the same trend in the future. The benefits of diagnostic analytics are great. They are related to a better understanding of the data, and therefore of the consumer's requirements through the answer to the previously mentioned type of question.

Descriptive analytics. Unlike the previous type of analytics, which is the most modern, descriptive analytics of big data represents the analytics most often used in

companies. It makes it possible to see trends in the environment, and is especially useful in the field of finance, production and sales. Its most important advantage is that it allows companies to understand a large amount of raw data, focusing on the most critical areas. With its help, the company can compare the current and past situation. Without that, it would not be possible to define the future, desired situation, that is, the position of the company.

Predictive analytics. The big data that is collected, with this type of analytics, is intended to enable future predictions. Machine learning and statistical modeling are tools that help with this. It enables accurate forecasting of the future, which can help the company using it to reduce costs, maintain inventory at an optimal level, and effectively manage future deliveries. In marketing companies or within the marketing sector in large companies, it enables attracting new and retaining existing customers in the future.

Prescriptive analytics. The last but not least type of analytics is prescriptive analytics as a combination of descriptive and predictive analytics. A well-known company that develops this type of analytics is Google. This type of analytics has been used to produce vehicles without human control. The benefits provided by this type of analytics relate to the improvement of processes, campaigns, strategies, production as well as customer service. It also helps define the company's priorities.

Benefits of Applying Big Data Analytics

Although the benefits of big data analytics are huge, reports on its use show that CEOs and executives are often hesitant to invest big money in analytics, due to previous disappointing experience and poor results from other companies that have applied this analytics in their business. The question arises as to why this kind of situation and skepticism among managers in companies is happening. The answer lies primarily in the high and unrealistic expectations of big data analytics, but also in the lack of knowledge for its application. (Milovanović & Marković, 2018)

However, if the company has knowledge and skills and is not averse to new ways of doing business, big data analytics can provide numerous advantages.

First, in the consumer segment, big data analytics can enable continuous observation and monitoring of consumer behavior patterns, on the basis of which a company can personalize its offer of products. For example, Amazon used this advantage offered by big data analytics, where based on previous purchases, it suggested to consumers what the next purchase would be good for them. (Saritas et al., 2021).

Second, focused and targeted promotions, made possible by big data, can lead to significant savings and prevent wasting a money on campaigns to the entire market, instead of focusing on the target market.

Thirdly, the identification and efficient management of risks is enabled with the help of big data, through optimizing decisions and predicting the future.

Fourth, the use of big data makes it possible to update existing products more easily through knowledge of consumer requirements, but also to create completely new ones through complete innovation.

Fifth, big data can significantly differentiate suppliers, which will make a big difference between those who use big data analytics and those who do not.

Sixth, the costs of data collection, storage and analysis are significantly reduced. The last but not the least important advantage is the achievement of efficiency.

In addition, a better understanding of market conditions can be cited as an advantage, as typified by the two fast food giants (McDonald's and Burger King), where the customer's order arrives either right on time or even earlier, which is the result of the use of big data. The next advantage is better decision-making, with the help of big data, as well as agile management of supply chains, especially in crisis conditions when supply chain disruptions, instability and high risks occur. (He et al., 2016).

In addition to the above advantages, there are also certain obstacles that completely or temporarily prevent companies from using big data effectively. Small and medium-sized enterprises, for example, find it more difficult to use big data for at least two reasons. The first is untrained employees and the second is the lack of finances to implement big data analytics. The lack of adequate staff is not only a problem for small and medium enterprises, but also for large enterprises. (Schroeck et al., 2012)

In addition, it is difficult to find those data that are relevant for the company's current operations from a pile of data. A lot of data from the data pile is completely worthless data that can only complicate the analysis process. This problem especially occurs when the data is collected from different sources and when it is unfiltered. Also, outdated data stored in databases can create problems, because decisions made based on them will lead to poor business performance.

In large companies, it is a very common situation that the data needed in one sector are stored in the database of that sector and are unavailable or partially available to other sectors. This is a big disadvantage, because one sector manages a limited database and has no communication with other parts, which leads to incomplete decisions.

The greater the amount of data in the company, the greater the fear of losing that data and the violation of security. Therefore, the larger the database, the more modern technologies need to be applied in order to increase security, in order to reduce the risk of data loss to a minimum.

In order to perform quality big data analytics, the use of technology is essential. Predictive analytics, for example, are used to avoid risk in decision-making. Hardware and software solutions enable scenario evaluation and risk minimization.

Non-relational (NoSQL) databases are used to manage data across a scalable number of storage nodes. Tools for discovering new knowledge are also used, which search data from different sources. Stream analytics is used when data resides on multiple platforms in different formats. It also enables connection to external sources. (Kolhe, 2023)

In-memory Data Fabric as the next technology helps to better distribute large amounts of data, which leads to lower latency. Data visualization as the next tool allows applications to retrieve data without technical constraints such as data formats and physical location.

In big data analytics, technologies are used to clean and transform data into information that is then used to make business decisions. After "mining" the data, algorithms and models are performed with the help of certain tools (e.g. Apache Spark, Splunk). Apache Spark is known for its speed and efficiency in running applications. It uses RAM (Random Access Memory) and supports a wide range of data analysis tasks and queries. Splunk is a tool used to analyze big data in order to get certain insights

from the pile of data. It has the ability to generate tables, graphs and dashboards. The big advantage it provides is the possibility of incorporating artificial intelligence into data processing.

In addition, data integration tools are used to simplify the data through numerical representation. It is not important to only provide quantity in the data, because without quality the result is not achieved. For this, data quality assurance software is used, which has the task of cleaning and enriching the data set through parallel processing. All tools are very important and, depending on the activity, primacy is given to some of the above. (Jahani et al., 2023)

Regardless of the stage in which the big data analytics development project is or the stage of the company's life, in big data analytics different options are used that result in good decisions, some of which have been used for a long period of time (e.g. Cloud, MapReduce, Complex Event Processing) to those that have been used recently, such as data visualization and predictive analytics.

Challenges in the applying of big data analytics

The problems or challenges arising from the large amount of data that needs to be processed and analyzed can generally be divided into two groups. The first group are technical challenges related to activities such as storage and efficiency in processing and analytics. On the other side are the semantic challenges arising from the unstructured nature of big data. These challenges include heterogeneity, incompleteness, scalability, timeliness, privacy and security (Jayashree & Abirami, 2018).

Heterogeneity. The collected data are from different sources, which causes the problem of heterogeneity of data formats. Data is mostly in unstructured form (email, pdf files, graphics, sound, animations, medical x-rays and so on). Converting all this data into a structured form is a big challenge where new technologies and methodologies must be adopted to solve the problem.

Incompleteness. Incomplete data occurs when the values of some fields are missing. Missing values can occur due to sensor repairs, system crashes, and other unpredictable events. Incomplete data makes good analytics impossible, so various data mining algorithms have been developed to deal with missing data or values.

Scalability. Scalability is one of the most important challenges in analytics, because we are dealing with huge amounts of data. Parallel data processing methods that were once used to process data are no longer efficient, as the size of data is increasing rapidly and continuously. Therefore, new approaches are being developed to solve the problem of increasing data size or elasticity.

Timeliness. In order to ensure the timeliness of the data, the data request must be processed much faster, which is very difficult due to the huge amount and heterogeneity of the data.

Security and privacy. The most important challenges that must be solved in big data analytics are security and privacy, because a breach of data security can do a lot of damage. For this reason, in order for users to store and process data in a secure manner, they must apply techniques and algorithms related to encryption, logging, honeypot mechanisms and fraud detection.

Databases store a large amount of sensitive data related to medicine, insurance, diagnosis, personal characteristics of the end user, etc. That is why organizations must store all data in a secure manner and each user must be authorized to view only the data that is relevant to him. All these data management issues related to privacy and security must be addressed taking into account the necessity of sharing data and information and investing in data protection. Each organization maintains its own data center that must ensure data confidentiality. Some data cannot be shared in order not to violate privacy. For example, data sharing becomes a challenge in a smart city, as data needs to be shared between different devices. Therefore, it is necessary to follow established procedures for sharing and exchanging information between different devices and departments. A large amount of data is updated and stored in various formats in real-time applications. Therefore, it is difficult to create a general data format and extract information directly from the application in real time.

Solving privacy and security issues requires huge investments. For example, in smart cities, sensors are used to record every single activity, accessed by several government and security agencies. As a result, location-based data is transmitted over the network, that is a particular threat to privacy. If security issues are not addressed properly, it can lead to malware attacks or hacking by some users who do not have good intentions. Since confidential information about people is collected and stored in the database, several security policies and procedures must be followed to protect the data from unauthorized users and from viruses or bug attacks. The privacy rights of organizations and individuals must be clearly stated and protected. In certain cases, such as medical records, banking and financial records, stricter data protection measures must be applied.

Domains of application of big data analytics

The use of big data today provides great benefits that enable the company to gain a competitive advantage over other companies that do not apply analytics in their business. Although the investment in equipment and knowledge of employees who work with big data is large, the advantages and benefits that are realized exceed the initial investment.

Big data has influenced changes in a large number of areas, from professional sports and media, to manufacturing, finance and education. The use of big data is of great importance in the healthcare sector, where there is a large amount of data on patients, then on supplies, capacity availability, etc. The use of big data, for example, during the Covid-19 pandemic made it possible to determine priorities in cancer treatment during that period. Also, retail is a sector that contains a large amount of data: data from loyalty cards, data on previous purchases, data from social networks. Big data analytics allows it to be better analyzed in order to personalize the offer delivered to consumers. Big data analytics is also important in the field of production, where it enables the evaluation of the degree of capacity utilization, the evaluation of the operation of machines and the people who work on them, etc. In finance, big data analytics can provide stock price data, evaluate potential investments and calculate risks. In the field of transport, it is possible to optimize routes, improve driving, etc. (Seddon & Currie, 2017)

Facebook, Google, Yahoo and Falcon generate large volumes of data. Also, Wal-Mart generates over a million customer transactions in 6,000 stores in one hour. Amazon Web Services was also successful in IaaS (Infrastructure as a Service) and achieved 70% market share, including the most popular Elastic Compute Cloud (EC2). Simple Storage Service (3S) enables the processing of 500,000 queries for millions of merchant terminal operations every day. Akamai was also able to analyze 75 million events per day. However, the most notable element in big data analytics is value. Thus, data has become extremely valuable in businesses for increasing productivity and for business predictions. (Saritas et al., 2021)

A key challenge in the field of engineering is to discover techniques that have the ability to process data about machines and the Internet of Things. It is estimated that by 2030, the size of IoT data will be one trillion(Wang et al., 2022). A large volume of data in engineering is generated by a wide range of sensors, through power plants, machine data and GPS, as well as electronic devices.

Large enterprises from various industries have started to implement their big data strategies and have started to use the benefits that it brings. Also, similar companies in the same sector or in other sectors have started to learn from them in order to design a framework for implementing their own big data strategies. Therefore, in all domains, big data analytics allows the company to determine what it is doing well and what is bad, provides a clear work plan without relying only on intuition and enables the rationalization of business activities.

Therefore, an increasing number of companies within various industries are investing in the construction of big data management systems, realizing that this is not just a luxury, but a necessity in the modern world, where we are all overwhelmed by a large amount of information that needs to be properly processed and analyzed.

Application of big data analytics in healthcare

The use of big data in healthcare is widely used, primarily due to the need of healthcare workers to provide their patients with the best possible conditions and treatment. By looking at historical data, which is combined with current data, it is possible to provide the whole picture, which enables the setting of better therapy, but also lower costs at the level of healthcare as a whole. Big data analytics help determine which treatments are most effective, which patient populations are at greatest risk, how to better allocate resources, etc. Also, good analytics provide a good basis for predicting and optimizing the future treatment. For example, if a trend of increasing certain diseases is noticed, the analysis determines whether it is necessary to build new facilities and hire new staff.

Big data analytics is used today to predict the outcome of decisions made by doctors, to predict the outcome of operations that have been performed, but also to make the above-mentioned predictions regarding overall capacity. Big data analytics in healthcare can be used in the treatment of cancer, genetic diseases, for the prevention and treatment of cardiovascular diseases, psychological diseases and other diseases. Big data analytics makes it possible to define, based on the information, the steps that make it possible to achieve healthy daily habits, in order to reduce the number of sick people. Furthermore, it allows patients to get the right care they need, then enables healthcare

providers to know what the best treatment option is for each individual patient at a given moment, then creates new ways of treatment and improves quality and value provided by healthcare providers to their patients. (Xie et al., 2018).

The benefits provided by big data analytics in healthcare relate to early diagnosis of diseases, then prevention of side effects, faster development of vaccines, prevention of spread of infectious diseases, prediction of crises and timely response. In the future, we will witness an increasing application of big data analytics. However, here too there needs to be a certain degree of caution related to increased protection of privacy, security, establishment of standards, as well as further improvement of tools and technologies used to process big data. (Akter & Wamba, 2016)

Due to the increasing volume of data in healthcare, experts in the field of information technology have more and more work to devise a way to implement big data analytics in healthcare organizations, with the aim of faster and more efficient treatment. The increase in the volume of data is due to the increase in the world's population, thus the number of patients, and the need to increase capacity and employed staff. (Chen & Zhang, 2014)

Application of big data analytics in the chemical industry

The chemical industry includes production facilities that process raw materials to reach the end product. In doing so, processes such as distillation, extraction, absorption, chemical reactions, etc. are used. As in other industries, including in the chemical industry, in addition to investing in the development of big data analytics and needed technology, it is necessary to invest in people who have knowledge about it, but also have knowledge about the chemical industry, which is specific in itself. The involvement of scientific research organizations, academic institutions and the government is recommended, in order to include machine learning and programming in the process, which, together with statistics, enable a more efficient application of big data analytics in this industry. (Cheng et al., 2017)

The application of big data in the chemical industry has been increasing over the years, with the tendency of further growth in the future, proportionally to the growth of the chemical industry. (Betty Jane, & Ganesh, 2020). In the area of production in the chemical industry, big data analytics will enable the right decisions to be made based on the data related to the layout and the way the equipment is used. A higher degree of utilization of equipment capacity as well as a more rational use will contribute to the reduction of waste in production, but also to an increase in yield. The equipment used in the chemical industry (turbines, compressors) are equipped with sensors that are used to collect data that make it possible to prevent stoppages, to maintain the equipment on time and to ensure that production runs continuously.

Big data analytics makes it possible to better manage supply chains in this industry, as well as to plan better, in order to respond in a timely manner in possible crisis situations. Chemical pricing strategy can be determined more reliably through the analytics of big data collected from various sources, rather than based on past prices and traditional methods where there is an incomparably greater possibility for errors. In addition, the process of innovation is accelerated and the time for bringing products to the market is shortened, as well as optimal energy management, which is a special

feature of the chemical industry, where several plants operate simultaneously. Then, with the help of the sensors on the machines, smooth simultaneous work is enabled. Sensors provide multiple data points and control non-standard process variables, which increases energy efficiency.

The monitoring of complex serial processes, then the evaluation of controller performance, as well as integrated planning, are possible with the help of big data analytics. Modern petrochemical and chemical plants that are integrated contain a large number of production units that are grouped in a specific location. According to a Pricewaterhouse Coopers survey, 88% of chemical plant managers believe that the use of big data is critical to maintaining a competitive advantage (Wang et al., 2022). It is one of the industries that first saw the importance of big data and started using it.

Application of big data analytics in science and higher education

In science, researchers use a large amount of data that can possibly lead them to new scientific discoveries or improvement of existing ones. They often face the problem of understanding and interpreting the available data. For example, through the study of the genome by scientists, gene mutations are associated with both developmental disabilities and cancer. Also, the number of articles published in the world increases every year, where the annual average is 1.8 million articles (Hariri et al., 2019). As the average researcher reads between 200 and 300 articles annually, it is impossible to be familiar with all the articles that are published annually. There is room here for the use of big data analytics and technology that, together with machine learning, will enable better scientific articles and research, as well as better scientific work by researchers around the world.

A field closely related to science is higher education. Technology was introduced into higher education strategically and planned, with the aim of improving the process. It is under the scrutiny of the agencies that carry out its accreditation, then the state apparatus, but also society. In higher education institutions, there is a lot of data that needs to be processed. The application of big data in the future would affect administration, teaching, learning and overall academic work. Also, it would lead to the creation of innovations in this area, better planning, creation of better programs, teaching methods, which is especially important today, when it is necessary to adapt learning to the modern lifestyle of the youth. (Constantiou & Kallinikos, 2015)

Recruiting, admissions processing, financial planning, tracking student results, making administrative decisions, assisting students, tracking and managing donations, are some of the application areas of big data analytics. There is data from Arizona (Mikalef et al., 2019), where one university, when conducting online classes, monitored the number of mouse clicks by students, the number of views of sent content, how long they stay on certain topics, etc. Also, if this kind of analytics is used on courses organized by the faculty, it can be determined already after the first week with an accuracy of about 70% which participants will complete and which will not complete the course they are attending. In this way, those who lag behind others are identified, at the right moment, in order to help them at that moment and to increase the success of the course to the highest possible level.

In addition, big data analytics in education supports curriculum designers to manage course content, develop personalized recommendation modules, and the

concept of smart education using natural language processing and text summarization technologies. Also , data generated through massive open online courses (MOOCs) helps to identify difficult-to-master course content and support students to improve teaching and learning.

Other application areas of big data analytics

There are other areas of business and industry that have benefited from big data analytics. These areas generate a huge amount of data that requires analysis for effective decision-making. These application areas include telecommunications, network optimization, travel estimation, retail, finance, and energy consumption, to name a few. These application areas are explained below (Ajah & Nweke, 2019).

Network optimization. Business analytics and big data technologies can be used to design mobile networks to provide efficient services. This area includes content-centric analysis, network traffic analysis, and network signaling to ensure efficient service delivery and quality of service delivery. Network operators typically collect, store, and analyze network user data for efficient signaling, traffic variation and congestion prediction, intelligent optimization and automatic network self-configuration, and the development of intelligent data transport across the network.

Travel prediction. Mobile users generate a large amount of data during calls that can be recorded in the form of call data records (CDRs). Based on CDRs, travel data can be aggregated, stored, processed, and analyzed to recommend routes, track locations, determine the origin of travelers to work, plan destination, and manage transportation. Mobile big data can be analyzed to recommend routes in a complex environment by implementing a smart multimodal platform that uses personal data and global constraints. Algorithms monitor the state of cities in real time and identify congestion on specific routes to recommend alternative routes that are less congested. These algorithms have already been applied in drone routing, infectious disease, and identification of hotspots in emergency situations. To ensure data privacy and security, data sets are usually anonymized using computer-generated unique identifiers to replace subscriber phone numbers. The application has shown that mobile big data analytics for trip assessment can significantly assist in transportation and travel planning.

User behavior modeling. User behavior modeling helps in understanding the patterns that occur during navigation. The goal of understanding these patterns is to develop user-centric applications. These applications are important in detecting anomalies, fraud, and spam in social media and enable changes in social behavior for targeted marketing.

Human mobility modeling. People are characterized by the fact that they follow a regular movement pattern over a period of time. The repetition of such a pattern allows for effective prediction of global movement, which can be used in disease prevention, disease containment, transportation planning, and emergency situations. For this purpose, big data from social networks, GPS data, call records, and geo-tagged data is used for analysis.

Service recommendation. Big data and business analytics technology can be effectively used in service recommendation, targeted advertising using information about user location, product reviews, time, and product purchase behavior. Customer

reviews can be analyzed to understand the advantages and disadvantages of products, determine predictors of review readability, and increase sales.

Energy consumption analysis. Determining the amount of energy consumed in a household is a way to promote efficiency, green energy use, and environmental protection. Big data technology is used to analyze energy usage patterns to promote green energy. This is achieved by using embedded sensors and communication networks in the electricity supply that help digitize, store data, and analyze energy consumption rates. In addition, big data technology helps energy companies improve energy sales and ensure return on investment.

Finance. Since financial institutions are accessed via the Internet, the creation of large amounts of data is a natural consequence, which further implies the application of big data technology for effective decision-making. Analysis of financial statements and data would help in detecting money laundering activities, financial statement fraud, financial spam, impersonation, identity theft, and other cases related to financial fraud.

Sports. Another interesting area of application of big data is sports, where coaches, players, and managers in sports recognize the possibilities of big data analytics. For example, in athletics, athletes are monitored in the following parameters: speed, performance, time, kilometers run per day, etc. Statistical methods and techniques are applied to the collected data to determine the capabilities of the athletes. Based on this data, coaches can easily identify which player needs additional support, training and instructions for further work. This will certainly help to increase the performance and progress of the player.

Video games. People who play video games typically collect three main groups of data: game, player, and session data. The amount of data that players generate every day is growing rapidly. By analyzing the collected data, such as user behavior, rewards, activity, leaderboards, character selection, game developers will be able to improve or upgrade game features and versions. Game improvements help to improve the gaming experience.

Telecommunications. A very big challenge facing the telecommunications sector is the volume, variety, and complexity of telecommunications service provision. To overcome this challenge, a combination of different technologies is used, such as data warehouses, traditional databases, and big data. These technologies store and process a huge amount of data generated by location sensors, IPv6 devices, clickstreams, CDR, 4G networks, and machines. In addition, these technologies manage various forms of unstructured data, such as data from mobile devices, the web, email, etc.

Conclusion

Big data analytics as a process of collecting, processing and analyzing large amounts of data in order to make decisions is attracting the attention of a large number of researchers and practitioners from different fields. The topicality of this topic is increasing over time, considering the increase in the number of data that needs to be analyzed. With its application, it is possible to monitor customer requests, focus on the target market, manage risks and collect data from various sources. However, the limitations that companies most often face are the lack of trained people to manage big data analytics, as well as the necessary investments in technology to process them.

The widespread use of big data in a large number of activities is the current situation. In healthcare, it is used for better decision-making about diagnoses, then for unifying all patient data, but also for better management of procurement, etc. In the chemical industry, it is used to better manage a large number of plants that work together, while in science and higher education, it is used to analyze student data, create lesson plans, and analyze the large number of articles that are published on a daily basis.

Predictions regarding the growth of big data analytics say that its use will increase year by year and that more and more companies around the world will start using it. Growth is fueled by the development of technology and tools that shorten processing time and increase its accuracy.

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ENVIRONMENTAL PROTECTION THROUGH CIVIL LAW INSTRUMENTS IN THE LEGISLATION OF THE REPUBLIC OF SERBIA

Abstract

This paper provides an analysis of the environmental protection by the civil law using the instruments of law of property and obligations. The subjective rights recognized by the Law on Environmental Protection, the Law on the Basics of Property Law Relations and the Law on Obligations are regularly realized spontaneously, peacefully, by removing sources of harmful emissions, undertaking protective measures, stopping harmful actions and compensating for the resulting damage, by the bearer of legal duties on his own initiative or at the request of the rights holder. In cases where the duty holder does not fulfill the stated legal duties, an illegal situation arises due to the impossibility of realizing the subjective rights of the holder, who, using his constitutional right to legal protection, can exercise his subjective right in the proceedings before the court, with instruments of civil environmental protection.

The authors review property-law and obligation-law protection of the environment by means of an actio negatoria, as well as legal protection of obligations, with a special emphasis on actio popularis, analyzing their scope and scope in the field of environmental protection. Also, this paper proposes the possibility of introducing new instruments of civil environmental protection through the simultaneous action of state authorities to initiate civil procedures for environmental protection ex officio, as well as the introduction of instruments of a special civil procedure in which the object of protection would be the general interest in protection environment.

Key words: *environmental protetction, civil law protection, harmful emissions, actio negatoria, actio popularis.*

JEL classification: *K32, Q58, P14, P48*

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ЗАШТИТА ЖИВОТНЕ СРЕДИНЕ ИНСТРУМЕНТИМА ГРАЂАНСКОГ ПРАВА У ЗАКОНОДАВСТВУ РЕПУБЛИКЕ СРБИЈЕ

Апстракт

У овом раду дата је анализа грађанскоправне заштите животне средине инструментима стварног и облигационог права. Субјективна права призната Законом о заштити животне средине, Законом о основама својинскоправних односа и Законом о облигационим односима редовно се остварују спонтано, мирним путем, уклањањем извора штетних имисија, предузимањем мера заштите, обустављањем штетних радњи и накнадом настале штете, од стране носиоца правних дужности самоиницијативно или на захтев титулара права. У случајевима да носилац дужности не испуни наведене законске дужности, настаје противправна ситуација услед немогућности остварења субјективних права титулара, који користећи своје уставно право на правну заштиту, може своје субјективно право да остварује у поступку пред судом, инструментима грађанскоправне заштите животне средине.

Аутори дају приказ стварноправне заштите животне средине путем негаторне тужбе, као и облигационоправне заштите, са посебним акцентом на ацтио популарис, анализирајући њихов обим и домашај у области еколошке заштите. Такође, у овом раду предлаже се могућност увођења нових инструмената грађанскоправне заштите животне средине истовременим деловањем државних органа да покрећу грађанске поступке за заштиту животне средине ех оффицио, као и увођење инструмената посебног парничног поступка у коме би се у својству објекта заштите налазио општи интерес за заштиту животне средине.

Кључне речи: *заштита животне средине, грађанскоправна заштита, штетне имисије, негаторна тужба, популарна тужба.*

Introduction

As a result of accelerated technological development, as well as the development of civilization itself, it has been possible to improve the living conditions of millions of people, but at the same time it represents a serious threat to the further development and survival of humanity. Uncontrolled, unplanned exploitation of natural resources, together with accelerated industrialization, leads to unfathomable consequences for the survival of the living world on the planet, and therefore for humans as well. Industrial and economic development cause environmental damage. We are witnessing major ecological disasters, which have incalculable consequences for the environment due to the serious devastation of the living world on the planet. In order to achieve the concept of sustainable development of the environment, which is an essential prerequisite and ultimate goal of the efficient organization of numerous human activities on Earth, and in order to preserve the environment for future generations, it is necessary to establish effective mechanisms for its protection and improvement (Milošević et al., 2015).

The lack of awareness that environmental problems can be successfully dealt with, exclusively on the international level and through coordinated action on a global level, was present until a few decades ago. Efforts to solve environmental issues at the national level, with the absence of a systematic approach to environmental protection, yielded poor results (Milošević, Madžgalj, 2015). The previous activities of the states, which were implemented at the national level, showed a tendency to react to events or incidents depending on the available evidence, instead of predicting general or individual environmental threats and establishing a preventive framework (Milošević et al., 2017). Efforts to legally regulate environmental protection followed, both in international law through international organizations and in national legislations. Humanity has united in adopting international legal rules in the field of ecology and insists on their mandatory application, establishing associations and other types of organizations with the aim of protecting nature, while nature responds to man's bad actions with earthquakes, floods, acid rain, climate change, polluted waters and similarly, showing man that nature "can be a good servant, but also an evil master" (Lazić et al., 2021).

Environmental protection in the law of the Republic of Serbia is achieved through constitutional, administrative and criminal law protection, while this paper will analyze the civil law environmental protection by applying the method of description, as well as the comparative method.

Civil Law Instruments for the Protection of Environmental Rights

In the positive legislation of the Republic of Serbia, the protection of property rights is enforced in civil proceedings before the court. Property rights, which represent a constitutional category, are protected by the regulations of substantive law of a real and obligational character, and the procedure itself is regulated by adjective law. This protection is carried out by traditional instruments of protection of property rights and obligations, considering that the civil law regulations do not explicitly prescribe property protection of the environment (Drenovak-Ivanović et al., 2015).

The right to a healthy environment is one of the basic human rights that have the rank of constitutional principles and are guaranteed by the Constitution of the Republic of Serbia ("Official Gazette of the RS", No. 98/2006 and 115/2021), where Article 74 establishes that everyone has the right to a healthy environment and timely notification of its condition. The responsibility of all persons, especially the Republic of Serbia and the autonomous provinces, is prescribed for environmental protection, as well as for the duty to protect and improve the environment. Article 87 of the Constitution establishes the provisions related to natural resources, defining that natural resources are goods of public interest and assets used by the bodies of the Republic of Serbia are state assets. Natural resources are used under conditions and in a manner regulated by law. According to Article 97, paragraph 1, point 9 of the Constitution of the Republic of Serbia, it regulates and ensures sustainable development, a system of environmental protection and improvement, protection and improvement of flora and fauna, production, trade and transportation of toxic, flammable, explosive, radioactive and other dangerous substances.

Within civil law protection of the environment, we can distinguish between two types of protection - preventive and repressive. Preventive protection refers to the prevention of environmental damage and is achieved through three different lawsuits, namely: 1.

lawsuit due to emissions, 2. lawsuit due to disturbance of possesion and 3. environmental lawsuit, while repressive protection is achieved by submitting a request for compensation for the damage caused by environmental pollution (Šago, 2013). Our jurisprudence does not recognize non-material damage for mental pain suffered due to the negative impact of industrial and neighboring buildings, despite the fact that the right to a healthy environment is one of the basic constitutional rights, unlike comparative law (Lilić, 2011). The principle of prevention defines that it is considered unacceptable to wait for environmental damage to occur, because the general social interest dictates that measures be taken to anticipate the possibility of its occurrence and, if possible, act preventively, that is, if this is not possible, to limit it to the smallest possible scope and prevent the spread of its consequences. The principle of prevention and the principle of precaution are mutually correlated, because the principle of prevention starts from known risks and the causes of the occurrence of specific damage in the environment, and the principle of precaution extends the preventive action of policy and environmental law to cases where there is no complete scientific certainty about the possibility of realizing the risk, but the suspicion is strong enough to justify taking measures to prevent it (Pajtić, 2015).

It is extremely important to note that the civil law protection of life property in the Republic of Serbia is aligned with the internationally recognized ecological principles of judicial protection, which include the principles of restitution, compensation, as well as repression, if there are elements of a criminal offense in the act of the polluter (Mirčetić, 2010).

The provisions of the Environmental Protection Act ("Official Gazette of the RS", No. 135/2004, 36/2009, 36/2009 - other law, 72/2009 - other law, 43/2011 - Constitutional Court decision, 14/2016, 76/2018, 95/2018 - other law and 95/2018 - other law) regulate civil liability for environmental pollution. Article 104 stipulates that a polluter who causes environmental pollution through his actions or inactions is obliged to, without delay, take the measures determined by the accident protection plan and the rehabilitation plan, i.e. to take the necessary measures to reduce environmental damage or remove further risks, hazards or remediation of damage in the environment. If the damage caused to the environment cannot be remedied by appropriate measures, the person who caused the damage is responsible for compensation equal to the value of the destroyed property. Responsibility for damage is based on the principle of objective responsibility, in accordance with the provisions of Article 103, and the damage is compensated up to the value of the destroyed goods. The right to compensation is granted to any person who suffers damage, and in case there are no such persons, the Republic of Serbia reserves the right to compensation, in accordance with the provisions of Article 107. The procedure for compensation is an urgent procedure.

In addition to the principles of precaution, prevention, and remediation of environmental damage at its source, the legal system of the Republic of Serbia has introduced the "polluter pays" principle. This principle is adopted from European Union legislation and has also been embraced by non-member states (Directive 2004/35/CE of the European Parliament and of the Council on environmental liability with regard to the prevention and remedying of environmental damage, OJ L 143, 30.4.2004). The "polluter pays" principle is regulated by Article 9, paragraph 1, item 9 of the Environmental Protection Act ("Official Gazette of the RS", No. 135/2004, 36/2009, 36/2009 - other law, 72/2009 - other law, 43/2011 - Constitutional Court decision, 14/2016, 76/2018, 95/2018 - other law and 95/2018 - other law), stipulating that the polluter is obliged to pay compensation for environmental pollution

when their activities cause or may cause environmental burden, or if they produce, use, or market raw materials, semi-products, or products that contain harmful substances to the environment. Additionally, the polluter, in accordance with regulations, bears the total costs of measures for preventing and reducing pollution, which include the costs of environmental risk and the costs of remedying the damage caused to the environment.

For the prevention of environmental pollution and elimination of harmful consequences caused by pollution, some classical instruments of civil law protection are used, established by the provisions of real and obligation law, which have the character of subsidiary sources of law for environmental protection. Bearing in mind that the litigation procedure is a universal tool for the protection of civil law disputes, it is also applied to the settlement of environmental disputes. Litigation proceedings achieve both the immediate protection of the environment as a collective good and the protection of individual goods, thereby indirectly protecting the environment itself. Environmental litigation should be considered to be those procedures that have as their subject the protection of the right to a healthy, suitable, adequate environment and environment, as well as the protection of property rights in this area (Drenovak-Ivanović et al., 2015).

Actio Negatoria

The protection of neighbor's rights against harmful emissions can also be applied to the protection against ecological danger, if it is seen as a harmful influence. The very concept of harmful emissions is closely related to the concept of neighboring rights, which regulate the relations of owners of neighboring immovable properties. Everyone has the right to demand from their neighbors not to use their immovable property in a way that causes harmful emissions. These harmful effects (immissions) coming from the neighboring immovable property in the form of smoke, dust, unpleasant odors, heat, soot, noise, earthquakes, waste water, etc. Article 5 of the Law on the Basics of Ownership Relations ("Official Gazette of the SFRY", No. 6/80 and 36/90, "Official Gazette of the FRY", No. 29/96 and "Official Gazette of the RS", No. 115/ 2005 - other law - hereinafter: LBOR), it was established that the owner of the immovable property is obliged to refrain from actions when using the immovable property and to remove the causes originating from his immovable property, which hinder the use of other immovable properties beyond the measure that is usual considering the nature and purpose of the immovable property and the local conditions, or which cause more significant damage. Harmful emissions must be tolerated to a certain extent, that is, up to the so-called limits of tolerance, because it is simply a necessity. Exceeding the tolerance limit results in a certain responsibility of the emitter (polluter). A person exposed to excessive immissions has the right to request the application of certain technical means that reduce the immissions to a tolerable level, and if this is not possible, they can request a ban on the activity from which the immissions originate (Stanković, Orlić, 2019). The limit of tolerance is determined using a legal standard defining that it is a limit "which is usual considering the nature and purpose of the immovable property and the local conditions", which means that this standard is interpreted according to the circumstances of the case. Also, the legislator did not specify the criteria on the basis of which it would be possible to determine what kind of damage is considered "significant damage", which

represents another legal standard, but the court, looking at the circumstances of each specific case, concludes whether it is a significant damage, guided by the type and the extent of damage (Tošić & Ognjanović, 2012).

The application of legal standards has various functions. They help judges to interpret the rule to apply in a particular dispute in light of the specific facts of each case, but allow for flexibility as they take into account variations in individual cases. In this way, legal standards allow the legal system to adapt to social, technological and economic changes, without changing the text of the regulations that are applied. The standards of permissible behavior differ in different environments, and whether it has been exceeded is determined by the court. Considering that these legal standards are very vague, as well as that the criteria of "tolerability and attention of the average person" can be misused and differ between people, it is proposed to introduce the possibility of measuring immissions in accordance with the quantitative standards of natural, technical and medical sciences regarding their effect on human health. If this proposal were to be accepted, during the evaluation of the excessiveness of harmful effects in the judicial proceedings, the court would rely more on the expert opinion of people in the appropriate profession, and less on the mentioned legal standard, except in situations where these harmful effects are immeasurable, such as in the case of spreading stench, when it would be necessary to apply the standards of the average person (Lepetić, 1995). In this way, the judicial proceedings would become more precise and objective, relying on scientifically based criteria where possible, while subjective criteria would be used only in exceptional cases. Introducing precise and objective standards where possible can improve the fairness and efficiency of the legal system. However, subjective standards will still be necessary in situations where specific circumstances cannot be determined quantitatively, thus allowing the adaptation of the legal system to different social and individual contexts.

The damaged party can file a lawsuit against the tortfeasor for impediment or disturbance – *actio negatoria*. The name of this lawsuit is explained by denying the existence of the right of the defendant (Medić, 2021). With this lawsuit, the owner or holder seeks protection against disturbance (impediment) that does not consist of confiscation of things, with the request that the disturbance cease, as prescribed in Article 42, paragraph 1 of the LBOR. Harassment should have a permanent character, which means that: 1. the defendant's action is based on a permanent condition or 2. that the harassment procedure is repeated or 3. that according to the circumstances it can reasonably be expected that the harassment will be repeated. Actio negatoria "protects the owner from something that lasts or can be repeated, and does not protect him from something that was, then passed" (Rajačić, 1956) and its goal is to re-establish the previously peaceful state. This protection does not apply to protection against immissions that are of a one-time nature, that did not last long and where there is no fear of their repetition. Also, actions that have the property of bothering and disturbing must originate from human action. It is not required that the person causing the impediment or disturbance is guilty.

Actio negatoria, as a special property lawsuit, provides protection to the holder of property rights from disturbances by third parties, dating back to Roman law, specifically the Law of the Twelve Tables. This lawsuit in Roman law long protected not only the owner but also anyone holding the item for various reasons, such as a guardian, tenant, usufructuary, etc. The goal of this lawsuit was to stop the disturbance and to compensate the owner for the damage suffered.

In this lawsuit, the active legitimacy belongs to the owner or the presumed owner of the item, while the passive legitimacy belongs to the person causing the disturbance and/or the person who ordered the disturbance and/or the person for whose benefit the disturbance was caused without their order but later approved it. It is also considered that both singular and universal successors of the owner or presumed owner have the right to protection from disturbance, provided that the disturbance of property began while their predecessor was the owner and is still ongoing (Vučković, 2015). The lawsuit request pertains to the restoration to the previous state (in cases where the disturbance has created a new material situation), the cessation of the behavior causing the disturbance, as well as the prohibition of further disturbance. Additionally, the owner/holder of the item can request the implementation of appropriate technical measures to reduce emissions to a tolerable level, i.e., the court will, at the request of the interested party, order the implementation of appropriate measures to prevent damage or disturbance or to eliminate the source of danger, at the expense of the holder of the source of danger, if they do not do it themselves, in accordance with the provision of Article 156, Paragraph 2 of the Law on Obligations ("Official Gazette of the SFRY", Nos. 29/78, 39/85, 45/89 - USJ decision, and 57/89, "Official Gazette of the FRY", No. 31/93, "Official Gazette of SCG", No. 1/2003 - Constitutional Charter, and "Official Gazette of RS", No. 18/2020 – hereinafter: LO). The lawsuit in question, therefore, demands that the person causing the disturbance refrain from certain actions (omission, toleration, restraint), but it can also require action, i.e., undertaking measures to reduce emissions so that they do not exceed the limits of tolerance (Aćimović, 2015). To succeed in the lawsuit, it is necessary to prove the existence of a causal link between the defendant's activities and the disturbance, i.e., that the defendant's specific actions or omissions led to pollution or other harmful occurrences.

The cost of restoring the previous state always falls on the defendant, regardless of their fault. If, after the lawsuit request is granted, the disturbance by the defendant is repeated, i.e., the same actions are taken on the same item, the court will impose a penalty on the defendant in the enforcement proceedings based on the already rendered judgment. If the disturbance continues even after that, the court will impose a monetary fine in an increased amount.

The verdict on actio negatoria is condemnatory and it must clearly define the content and scope of legal protection. It has effect only against the defendant, but not against third parties. As with other property lawsuits, the right to file an action for removal does not expire, which is a civilized and legal standard.

Actio negatoria for the protection of the environment is a legal instrument for safeguarding the environment from harmful impacts, which can be filed by individuals, groups of citizens, organizations and government bodies in situations where someone with their behavior or activities damages the environment and thereby endangers the health, property or rights of other persons. It is based on the right of every individual to a clean and healthy environment, encompassing protection from pollution, noise, chemical emissions, waste, and other forms of environmental degradation. The primary objectives of the actio negatoria are to cease harmful activities, restore the disrupted state, prevent future damages, and raise public awareness about the importance of environmental protection and the legal instruments available for this purpose.

Additionally, real-property protection can be achieved through a lawsuit for disturbance of possesion as defined in Article 77 of the Law on Basic Property Relations (LBOR), which outlines the possessory (possession) lawsuit. Judicial protection from

disturbance or dispossession can be sought within a subjective period of 30 days from the day of learning about the disturbance and the perpetrator, while the objective period is no later than one year from the occurrence of the disturbance. Article 78 of LBOR stipulates that the court provides protection according to the last state of possession and the occurred disturbance, regardless of the right to possession, the legal basis of possession, or the conscientiousness of the possessor. Even a possessor who acquired possession by force, secretly, or through abuse of trust has the right to protection, except against the person from whom possession was obtained in such a manner, if the subjective and objective periods from Article 77 of LBOR have not elapsed since the disturbance. This protection is very effective because the procedure is urgent, and the burden of proving ownership or presumed ownership is not on the plaintiff; instead, the plaintiff must prove that they were the last peaceful possessor and that the defendant is disturbing their peaceful possession.

There are two forms of actio negatoria. In cases where the plaintiff proves ownership of the item, it is a vindicatory actio negatoria. It is sufficient to prove presumed ownership, in which case it is actio Publiciana. To succeed in their lawsuit, the plaintiff must prove that there is a disturbance, but they are not required to prove ownership or acquisitive possession, as there is a legal presumption for this, which greatly facilitates and speeds up this process compared to other property lawsuits in our legal system—such as the property lawsuit for the return of an item (Latin: *rei vindicatio*) and the lawsuit based on presumed ownership (Latin: *actio Publiciana*). Also, one of the advantages for the plaintiff in this dispute is that the plaintiff is not required to prove that the defendant does not have the right to undertake actions that cause the disturbance. Instead, the defendant, if they wish to succeed, must prove that they have the right to undertake the actions that the plaintiff claims are disturbances. The defendant may raise an objection that they hold a narrower real or obligatory right, or that the plaintiff is legally obliged to tolerate the disturbance, e.g., due to neighborly relations. The essence of this solution is based on the presumption of the inviolability of property rights.

Actio negatoria does not provide the possibility of removing sources of ecological emissions caused by industrial polluters operating with the approval of state, primarily administrative authorities. In such cases, only the implementation of measures, such as the installation of filters and possibly compensation for damages, can be requested. For this reason, many authors consider actio negatoria less suitable for ecological protection compared to the lawsuit provided for in Article 156 of the Law on Obligations (LO), which precisely offers such a possibility since it protects the interest of an indeterminate number of persons, i.e., the general interest. Therefore, there is no obligation for the plaintiff to prove their individual interest (Marčetić, 2010). Another disadvantage of actio negatoria when applied for real-property ecological protection stems from the very nature of the civil procedure, which respects the principle of party autonomy, binding the court to the lawsuit request and preventing it from acting ex officio. This means that a person suffering from excessive ecological emissions may decide not to file a lawsuit to stop the disturbance. Furthermore, during the court proceedings, they may withdraw or renounce their claim, which can result in significant and irreparable damage to the environment. One of the greatest challenges of actio negatoria is proving the direct link between the defendant's activities and the resulting damage, often requiring complex scientific research and various analyses. This frequently significantly increases the

financial costs of conducting this dispute, due to the engagement of experts, evidence collection, and analysis. Additionally, the lengthy duration of court proceedings can further exacerbate the environmental condition while awaiting a final court decision.

Due to the aforementioned reasons, it is necessary to establish mechanisms for environmental protection even in the absence of a private legal claim for protection. That is, the emphasized public interest in preserving the environment justifies providing protection to the environment itself by the competent authorities, even in the absence of a violation of someone's subjective right (Cvetić, 2014).

Some authors believe that the fastest and most efficient real-property protection against emissions can be achieved through the application of the institute of temporary measures in possessory disputes under Article 451 of the Civil Procedure Act ("Official Gazette of RS", Nos. 72/2011, 49/2013 - US decision, 74/2013 - US decision, 55/2014, 87/2018, and 18/2020 - hereinafter: CPA), which stipulates that the court may, during the procedure, ex officio and without hearing the opposing party, determine temporary measures in accordance with Article 460 of the Enforcement and Security Act ("Official Gazette of RS", Nos. 106/2015, 106/2016 - authentic interpretation, 113/2017 - authentic interpretation, and 54/2019) to eliminate an urgent danger of unlawful damage, prevent violence, or eliminate irreparable harm. At the request of a party, the court decides on the determination of a temporary measure within eight days from the date of submission of the proposal, and a special appeal against the decision to determine the temporary measure is not allowed. This ensures urgent and provisional protection of limited duration. Temporary measures in possessory disputes represent an instrument of urgent legal intervention by the court to temporarily regulate the situation until the final resolution of the dispute, where a quick reaction is crucial to prevent irreparable damage or serious infringement of the parties' rights in the procedure. The drawback is that the court must carefully balance the interests of both parties in the procedure for the temporary measures to be effective and fair without prejudging the final decision. This approach allows for a final decision based on complete facts without pressure or changes in conditions.

Actio Popularis

The provision of Article 156, paragraph 1, of the Law on Obligations (LO) stipulates that anyone can request from another to remove a source of danger that threatens significant harm to them or an indeterminate number of people, and to refrain from activities that cause disturbance or danger of damage if such disturbance or damage cannot be prevented by appropriate measures. Thus, this lawsuit has the nature of an environmental lawsuit, even though this is not explicitly stated in the LO.

This means that any interested person can file a lawsuit requesting the removal of a source of danger that poses significant harm to them or an indeterminate number of people, thereby granting procedural legitimacy to any person. In this way, a popular lawsuit (Latin: actio popularis) defines a condemnatory claim in the interest of the person filing the lawsuit or in the interest of an indeterminate number of people threatened by the source of danger (Babović, 2015). In legal doctrine, the prevailing view is that an environmental lawsuit can also be filed by a person who is not directly threatened by the danger of damage (Rakić-Vodinelić, 1989). In a preventive environmental lawsuit, it is necessary to prove the existence

of facts indicating the occurrence of a threatening danger, considering that the danger of damage must be certain and concrete, i.e., it cannot be conditioned by a future uncertain circumstance (Crnjanski, 2021). The primary goal of an environmental lawsuit is to act preventively against activities harmful to the environment. An environmental lawsuit can prevent the initiation of activities that could harm the environment before the damage occurs (Lilić, 2011), i.e., not only in the case of violation but also in the case of endangerment (Gajinov, T., 2015).

As already mentioned, any physical or legal person can act as a plaintiff by applying the procedural institute of ius standi in iudicio, based on which the civil court exceptionally grants the status of a party in the proceedings to those forms of association that do not have party capacity in accordance with the provision of Article 74, paragraph 3, of the Civil Procedure Act (CPA), provided that this exception has legal effect in the specific lawsuit. There have been many such examples in the jurisprudence of courts in the Republic of Serbia (Decision of the Commercial Appellate Court, Pž 43/2021 of 10.2.2021; Decision of the Commercial Appellate Court, Pž 7335/2016(2) of 17.11.2016). Passively legitimized is any person, whether physical or legal, performing an activity that represents a source of danger (Crnjanski, 2021). In the capacity of an intervenor on the plaintiff's side, certain legal entities and competent authorities can also appear as joint co-litigants if they can independently initiate an environmental lawsuit in preventive environmental litigation, while other physical and legal entities whose interests are protected by the lawsuit for the protection of collective interests and rights can appear as ordinary intervenors (Crnjanski, 2021).

The most significant advantage of this lawsuit, rooted in Roman law, is that anyone can demand from another person to refrain from disturbance without needing to prove their own interest. It represents a procedural form of the democratic right to seek the protection of public interest, which was of exceptional importance before the enactment of the Environmental Protection Act ("Official Gazette of RS", Nos. 135/2004, 36/2009, 36/2009 - other law, 72/2009 - other law, 43/2011 - US decision, 14/2016, 76/2018, 95/2018 - other law, and 95/2018 - other law). This lawsuit can be filed by all interested parties, even those not directly threatened by danger, while other private lawsuits can be actively legitimized only by parties claiming that some of their subjective rights or legally protected interests have been violated. In the case of a preventive lawsuit to remove the source of danger, this lawsuit protects not only the private interest of the plaintiff but all citizens, as environmental protection is in the public interest (Pajtić, 2015).

This legal institute is regulated differently in comparative law, so besides the Republic of Serbia, actio popularis is regulated in Croatia, the Netherlands, and Portugal. In other countries, it is represented by the institute of class action, where one or more representatives of a group file a lawsuit on behalf of others, such as in England, Finland, and Sweden, or through organizational lawsuits filed by associations to protect collective rights and interests, e.g., France.

There are opinions that the popular lawsuit is a relic of the past, rarely encountered in comparative law, considered outdated, and that its role in legal legislation is insufficiently significant (Danilović, 1968). Moreover, since 1978, when this lawsuit was legally regulated, it has never been filed as a popular lawsuit in judicial practice, but exclusively for the protection of the plaintiff's personal interest. The reason for this may be, as some authors state, that citizens do not have a developed awareness of the need to protect interests, are not interested in protecting public interest by filing a lawsuit, lack sufficient financial resources

to initiate and conduct such proceedings, and that there is a "possibility of achieving the goal of this institute in administrative proceedings" (Babović, 2015). Due to all of the above, it can be expected that this legal institute will be used more by associations engaged in environmental protection than by citizens (Radonjić & Stjelja, 2018). There is also an evident need to regulate a special civil procedure for the protection of collective interests, given that the procedure for the protection of collective interests and rights of citizens under Article 495 of the CPA could not be applied if a popular lawsuit was initiated (Rakić-Vodinelić, 2011), and the Constitutional Court declared all provisions of Chapter XXXVI of the CPA (Articles 494-505), which relate to the procedure for the protection of collective rights and interests, unconstitutional (Decision of the Constitutional Court, IUz 51/2012 of 23.5.2013, "Official Gazette of RS", No. 49/2013). The same shortcoming exists in comparative legislation, for example, in the Civil Procedure Act of the Federation of Bosnia and Herzegovina ("Official Gazette of FBiH", Nos. 53/03, 73/05, 19/06, and 98/15), because the provisions of this law regulating the lawsuit for the protection of collective interests do not have an independent nature and require, as one of the conditions for the admissibility of the lawsuit, that the special regulation envisages authorization for filing such a lawsuit, which currently does not exist (Radončić, 2021). It is noteworthy that the institute of popular lawsuit, as defined in Article 156 of the LO, is retained in Article 111 of the second book of the draft Civil Code of the Republic of Serbia, indicating a clear tendency to maintain this provision in our legislation in the future.

Conclusion

Civil law protection of the environment can be achieved through instruments of real and obligatory rights. Analyzing the positions of legal science and jurisprudence in the field of environmental protection, it can be concluded that the legal basis for environmental protection is defined by the provision of Article 5 of the Environmental Protection Act (LBOR), which represents *lex specialis* in relation to the provision of Article 156 of the LO. Environmental lawsuits provide protection not only to individual interests but also to the general interest of all people to exercise their right to a healthy environment. An environmental lawsuit can prevent the initiation of activities that could harm the environment before the damage occurs, highlighting its preventive effect.

Given the limited scope of real and obligatory law instruments for environmental protection, and with the aim of further perspectives on civil law protection of the environment, it is suggested to consider the possibility of simultaneous public law protection by authorizing state authorities to initiate civil proceedings for environmental protection ex officio. Leaving the protection of subjective rights to the owner can lead to unforeseeable consequences for the environment due to the principle of autonomy of will, based on which the owner can decide not to seek protection or to withdraw the lawsuit during the initiated dispute. Given the presence of public interest in environmental protection, it is neither efficient nor purposeful to leave its protection to private initiative, i.e., to allow the realization of protection to depend on private legal claims for protection. Continuous work on environmental awareness at all levels, from the state to the individual, is necessary for the full observance of environmental regulations.

Additionally, another development direction could be the introduction of instruments of special civil procedure where the general interest of environmental protection is the

protective object. For more complete and effective environmental protection, it is necessary to combine real, obligatory, administrative, and criminal law instruments. Moreover, to achieve more effective environmental protection, simultaneous coordinated legislative intervention in the domain of material and adjective law in this area is essential.

An alternative course of action, if there is no possibility or will to adopt the proposed measures, could be to function within the existing legal framework, i.e., the efficient implementation of existing rules defined by positive legislation.

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IMPACT OF THE AMERICAN BANKING CRISIS ON EUROPEAN BANKS

Abstract

Until the disruption in the banking market, in 2023, monetary policy was considered a less important indirect factor that can lead to banking crises. In 2023, a disruption occurred, which proved exactly the opposite, namely that monetary policy can directly cause imbalances in the banking market. According to many authors, this crisis is much stronger than the one in 2008. It was caused by an aggressive increase in interest rates by the American FED (Federal Reserve System). The measure led to huge losses on government bond portfolios held by US banks. The losses influenced the emergence of fear among depositors who withdrew their money from banks and thus led to the collapse of four American banks. The imbalance in the banking market did not remain only in the United States of America but spread through a domino effect to the rest of the world, and above all to the European market. The reason for the emergence of this disorder was not only interest rates. The atmosphere in the financial sector has been tense for a long time. Covid-19, the war in Ukraine, but also the unethical behavior of certain banks are just some of the factors that contributed to the appearance of instability in the banking market. The aim of this paper is to point out the causes and consequences of the banking crisis that just started in the United States of America [USA] and spilled over to the rest of the world, but also to point out the importance of the responsible behavior of banks and the deposit insurance system in prevention and preventing banking crises.

Key words: *banking crisis, interest rates, deposit insurance, instability*

JEL classification: *E52, G21, G22*

УТИЦАЈ АМЕРИЧКЕ БАНКАРСКЕ КРИЗЕ НА ЕВРОПСКЕ БАНКЕ

Апстракт

Све до настанка поремећаја на банкарском тржишту, 2023. године, монетарна политика се сматрала мање битним индиректним фактором

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који може довести до банкарских криза. 2023. године се десио поремећај, који је доказао управо супротно, а то је да монетарна политика може директно узроковати неравнотеже на банкарском тржишту. Ова криза је по многим ауторима доста јача од оне из 2008. године. Настала је агресивним повећањем каматних стопа од стране америчког ФЕД-а (Федерал Ресерве Систем). Ова мера је довела до огромних губитака на портфељима државних обвезница које држе америчке банке. Губици су утицали на појаву страха код депонената који су свој новац извлачили из банака и тако довели до пропасти четири америчке банке. Неравнотежа на банкарском тржишту се није задржала само у Сједињеним Америчким Државама већ се домино ефектом проширила и на остатак света, а пре свега на европско тржиште. Разлог настанка овог поремећаја нису биле само каматне стопе. Атмосфера у финансијском сектору је већ дужи период била затегнута. Цовид-19, рат у Украјини, али и неетичко понашање појединих банака само су неки од фактора који су допринели појави нестабилности на банкарском тржишту. Циљ овог рада је да се укаже на узроке и последице банкарске кризе која је управо почела у Сједињеним Америчким Државама и прелила се и на остатак света, али и да се укаже на значај одговорног понашања банака и система осигурања депозита у превенцији и спречавању банкарских криза.

Кључне речи: *банкарска криза, каматне стопе, осигурање депозита, нестабилност*

Introduction

The biggest concern of all banks is exposure to risks - primarily to systemic risks. Therefore, great attention is paid to risk measurement. In this process, the balance categories are first assigned to different risk categories, then the merging, that is, the aggregation of different risk categories that belong to the same model is performed, and finally, various risk protection measures are implemented. For example, if a credit portfolio is considered, its risk analysis is performed based on various credit rating analysis models. The common measure of risk directly affects the level of liquid assets that a bank must have available to meet liquidity requirements. It is a model-based approach, and it has drawbacks: those related to the risk situations that the model captures based on experience, and those related to the possibility of risk manipulation by those who know the model. It is extremely expensive and unfeasible to predict all situations that may arise in business, and therefore it is unrealistic to expect that all these models can predict and eliminate risks in advance.

The situation in the financial sector has recently been further aggravated by developments in the real sector, which have worsened since 2020, when the crisis began due to the escalation of the pandemic caused by the Sars-cov-19 virus. The whole world stopped for a few months, people lost their jobs and activities that can be done from home and online flourished. The Covid-crisis was just an introduction. Already in 2021, the Russian-Ukrainian war occurred, which led to the impossibility of importing strategically important products from these countries. These are the situations that shook

the real sector in the past period but also led to a collapse in the financial market when only one move - an increase in interest rates - led to the collapse of banks.

Considering these factors, this paper examines the impact of the 2023 US banking crisis on European banks. The hypothesis of the research is that this crisis had a significant negative impact on the stability and operational performance of European banks, with some banks demonstrating greater resilience while others proved more vulnerable in times of financial instability.

The real sector and the population were affected by the aggressive behaviour of banks which, even in previous crises, showed that excessive risk-taking leads to financial instability (Ashton & Christophers, 2015; Ivashina & Scharfstein, 2010). The fact is that such behaviour of banks undermines public confidence in the banking sector's ability to efficiently allocate financial resources and thus contribute to social development (Claessens, 2017). In view of this, numerous regulators have enacted stricter regulations for risk control in the banking industry. Established new procedures and bodies to identify, monitor and mitigate risks affecting financial security, such as the Dodd-Frank document for consumer protection in the United States (Acharya et al., 2011) or the Financial Security Committee in the United Kingdom (Duncan & Nolan, 2020). To increase trust in the banking sector, socially responsible initiatives are increasingly encouraged, which means that banks support environmental protection initiatives, make lending decisions not only based on profitable but also based on ethical criteria.

In 2023, one of the banking crises happened, first in the United States of America and then in the whole world. No one expected that the rise in interest rates would lead to the collapse of banks caused by the withdrawal of deposits. Banks did not adequately assess the risk of an increase in interest rates and therefore did not have adequate stocks of liquid funds with which to react in the event of a "bank raid".

The aim of this paper is to point out the factors that led to the banking crisis in 2023 and the consequences that the crisis left behind, but with reference to the responsible behaviour of banks and the establishment of a deposit insurance system. In the first part of the paper, there will be more words about banking crises – the factors, causes and consequences of the banking crisis from 2023. After that, there will be talk about deposit insurance as a response to banking crises, and at the end there will be more words about impact of the American banking crisis to European banks.

Theoretical Framework of Banking Crisis

The American banking crisis of 2023 can be analysed through various theoretical lenses, including macroeconomic theory, financial stability theory, and banking regulation theory.

Macroeconomic factors play a significant role in banking crises. According to the Keynesian framework, economic downturns can lead to banking crises as declining aggregate demand results in reduced business revenues and higher default rates on loans (Keynes, 1936). In 2023, the U.S. experienced a significant economic slowdown due to a combination of factors, including:

1. *Post-pandemic economic adjustments:* The economic disruptions caused by the COVID-19 pandemic led to significant adjustments in consumer behaviour, supply chain structures, and labour markets (Centre for Economic Policy

Research [CEPR], 2020).

2. *Monetary Tightening*: The Federal Reserve's aggressive interest rate hikes to combat rising inflation increased the cost of borrowing, which in turn put pressure on borrowers and increased the risk of loan defaults (Board of Governors of the Federal Reserve System, 2023).
3. *Global Economic Uncertainties*: Geopolitical tensions, trade disruptions, and fluctuations in commodity prices created uncertainties that adversely affected economic stability (World Bank, 2024).

The theory of financial stability emphasizes the importance of a sound and resilient financial system. Banking crises often stem from systemic risks and the interconnectivity of financial institutions (Mishkin & Serletis, 2011). Key aspects include:

1. *Asset Bubbles and Credit Expansion:* Rapid credit expansion and speculative bubbles in asset markets (e.g., real estate or stock markets) can create vulnerabilities. In 2023, a significant correction in the housing market and declining stock prices put pressure on banks' balance sheets.
2. *Liquidity Mismatch*: Banks operate on a maturity mismatch, borrowing short-term while lending long-term. In times of stress, this can lead to liquidity shortages. The sudden withdrawal of deposits and the freezing of interbank lending markets exacerbated the liquidity crunch.
3. *Contagion Effect:* The interconnectedness of financial institutions means that the failure of one bank can trigger a domino effect, leading to broader financial instability. The collapse of a few mid-sized banks in 2023 had a cascading effect on the broader banking sector.

Effective banking regulation is critical in preventing and mitigating banking crises. However, regulatory failures or inadequacies can contribute to crises (Admati & Hellwig, 2013):

1. *Regulatory Arbitrage:* Banks may engage in regulatory arbitrage, exploiting loopholes to take on excessive risks. The 2023 crisis highlighted gaps in the regulatory framework that allowed some banks to over-leverage and engage in risky lending practices.
2. *Capital Adequacy:* Regulatory requirements for capital adequacy are designed to ensure that banks have sufficient capital buffers to absorb losses. In 2023, several banks were found to have inadequate capital levels, exacerbating the crisis.
3. *Supervisory Oversight:* Effective supervisory oversight is essential to monitor and address emerging risks in the banking sector. In some cases, supervisory failures allowed problems to fester until they reached a critical point.

The American banking crisis of 2023 had significant spillover effects on the European banking sector, driven by several channels: cross-border lending, investment in U.S. financial instruments, operations of subsidiaries. Banking crises erode confidence in the financial system. The crisis in the U.S. led to a loss of confidence among European investors and depositors, prompting precautionary withdrawals and reduced lending. The contagion effect was particularly pronounced in countries with weaker banking systems or existing vulnerabilities.

When prepared this work, authors used various references related to this topic, including the latest published papers about U.S. banking crisis. During the research, content analysis of secondary data sources was also used. The result of this paper is an attempt to understand the impact of American banking crisis to European banks.

A banking crisis implies the bankruptcy of one bank or the entire system of banks. They arise suddenly due to changes in the private sector's perception of macroeconomic and financial stability. Often, the state does not recognize the first signs of a crisis, so ex post measures are implemented late.

Financial and therefore banking systems are very sensitive to changes and subject to frequent periods of instability. Due to the nature of their balance sheet, which is a reflection of the bank's activities (illiquid assets and short-term liabilities), banks are more prone to problems than other sectors, and the spillover of those problems on a global level. Banking crises are not good for the economy itself. They affect the economy more than the collapse of other financial institutions. Banking crises cause the loss of depositors and creditors, lead to disruption of the payment system, break up long-term business relationships between the bank and the client, but also affect the operations of other banks on a global level. As a result of the banking crisis, there is also a disruption in the real sector, in the sense that the relationship between consumption and accumulation is disrupted, which leads to reduced efficiency in business entities. This trend leads to the creation of panic, which in the end usually results in political and social unrest (Todorović, 2010).

The costs of exiting the crisis are not harmless, but they are not the same either. They vary from case to case. In any case, they capture a large part of the GDP (gross domestic product [GDP]), i.e. taxpayers' money, so it is necessary to implement deposit insurance programs on time, in order not to lose confidence in the banking system and thus avoid banking crises.

Because of the fear of the emergence of new crises, after the Second World War, stricter regulation and control of banks was established, all in fear of a repeat of the crisis from the beginning of the 1930s. For these purposes, a measure of state ownership of banks was introduced in some countries, which worked until the 70s. However, the emergence of innovations in financial institutions did not go in accordance with the rigid rules of the functioning of the banking system, so these restrictions were gradually abolished, and the emergence of financial liberalization occurred. All this led to several global banking crises in the 1980s and 1990s. Simply, liberalization leads to an increase in interest rates and thus increases the risk of crisis.

Research and methodology

In this research, authors focused on qualitative analysis to investigate the impact of the recent US banking crisis in 2023 on the operations of European banks. The basic research hypothesis is that this crisis had a significant negative impact on the stability and operational performance of European banks.

The authors drew conclusions by analysing the reports of relevant institutions that monitor business operations at the global level, both in the financial and real sectors. The goal of this analysis is a deeper understanding of the dynamics of the impact of the American banking crisis on the operations and success of European banks, emphasizing their resilience or vulnerability in challenging times.

For these purposes, the authors summarized in Table 1 the changes in performance indicators of American and European banks, such as stock prices, net interest income, capital adequacy ratio, loan and deposit ratios.

Table 1: Changes in performance indicators of American and European banks during the American banking crisis in 2023

Performance	*American banks*	*European banks*
Stock prices	Stock prices have seen a significant decline due to the economic slowdown, aggressive interest rate hikes by the Federal Reserve and the failure of several mid-sized banks. The increase in borrowing costs led to a decrease in consumption and investment, increasing the risk of loan defaults. The collapse of several banks caused panic in the markets and a massive sell-off of banking stocks. Although regulatory interventions provided some stability, bank stocks remained under pressure throughout the year.	The decline in investor confidence led to the withdrawal of capital from European banks. This situation particularly affected banks that were exposed to the US market or had significant investments in US financial instruments. In addition, pressure on liquidity and rising borrowing costs further weighed on European banks, causing their stock prices to fall.
Net interest income	The American banking crisis in 2023 had multiple effects on net interest income in banks. Although higher interest rates may have initially increased NII, other factors such as reduced lending activity, liquidity problems, increased deposit costs, and deteriorating credit quality have collectively reduced NII in many banks.	Although the US banking crisis in 2023 did not directly affect European banks, its impact on the global economy and financial markets had significant repercussions on the NII of European banks. Increased global economic uncertainty, restrictive monetary policy, withdrawal of capital from European banks, increase in credit risk, fluctuations on the currency and real market led to a decrease in net interest income in European banks.
Capital adequacy ratio	The American banking crisis in 2023 had multiple negative effects on the capital adequacy ratio of American banks. Asset losses, increased loan loss provisions, liquidity problems, declining investor confidence, and regulatory pressures all contributed to the decline in banks' capital and their CARs. Although some measures may have temporarily improved revenues, the overall effects of the crisis have reduced banks' capital adequacy, putting additional pressure on their financial stability.	The decline in the value of US investments, increased credit risks, increased funding costs, liquidity problems, currency fluctuations, regulatory pressures and declining investor confidence have collectively contributed to the decline in European banks' capital and their CAR. European banks, therefore, had to take additional measures to ensure their stability and resistance to similar shocks in the future.
Loan – to - deposit ratio	Increased demand for deposits, reduced demand for loans, cautious banks in issuing new loans, liquidity measures, tightened regulatory requirements, and rising interest rates all contributed to the decline in loan to deposit ratio.	The US crisis caused global economic uncertainty, which increased the demand for safe deposits around the world, including European banks. However, the reduced demand for loans, the increased caution of banks when issuing loans, liquidity measures, and increased regulatory requirements have influenced the reduction of loan to deposit ratios in European banks as well.

Sources: Board of Governors of the Federal Reserve System, 2023; World Bank, 2023; Ozili, 2023; Stanković et al, 2022; Admati & Hellwig, 2013; Claessens, 2017; De Grauwe, 2010; ILOSTAT, 2022; World Bank, 2024.

Causes and Contributing Factors of the 2023 Banking Crisis

Until 2023, monetary policy was seen as one of the potential causes that indirectly led to the financial crisis. This especially applies to earlier banking crises, such as the one in 2008-2009. years. Mostly, instead of monetary policy, factors such as inadequate risk management, ineffective regulation and control of banking and financial transactions, a large share of non-performing loans, and a low capital adequacy ratio were highlighted (De Grauwe, 2010).

Changes in interest rates were not considered as a potential direct cause of banking crises and therefore the scenario from the beginning of 2023 happened. The increase in interest rates led to the banking crisis in the USA and the systemic collapse of banks in Europe (Živkov, 2011). It was this banking crisis that led to the unconventional - full insurance of deposits to solve it (Ozili, 2023). This way of suppressing the banking crisis leads to short-term positive results, however, previous literature says that this type of deposit insurance is economically unprofitable and politically difficult to implement (Cerrone, 2018).

There is a lot of research on the factors that cause banking and financial crises. However, so far, no consensus has been reached on this issue. It is obvious that the list of factors that can influence the occurrence of banking crises increases over time. The literature often divides the factors that cause banking crises into microeconomic and macroeconomic. This is also logical considering that crises can affect individual banks, but also the banking system. Microeconomic banking crises are inevitable in situations when the value of banking assets falls below the value of banking liabilities due to the growth of banking liabilities. This conditions the decline of the bank's capital, which results in the bank's illiquidity or insolvency. A factor that leads to bank bankruptcy is inadequate forecasting and risk management, which causes poor quality of bank assets. There are many reasons for inadequate risk management. They often mention the granting of loans that cannot provide the bank with adequate performance, but also the granting of loans in an amount greater than bank debtors can handle. Among the reasons are the large approval of loans based on collateral, but also the dominant share of loans granted to one company or one branch (Alnabulsi et al, 2023).

When comparing the banking crises of 2008-2009. and in 2023, it should be noted that the banking sector was much more capitalized but also more strictly regulated in 2023 than in 2008. In addition to the application of instruments that serve to preserve financial stability, there was still a banking crisis, which has been resolved for the time being with full deposit insurance. The question arises, however, whether this method is really justified.

The banking crisis of 2023 did not happen all at once. It was created in a period when the world economy was still recovering from the consequences of the pandemic caused by the Sars-cov-19 virus. In parallel with that, the Russian-Ukrainian war was happening, which is still current.

The Covid-19 crisis has led to a widespread economic recession. The task of the states was to stimulate aggregate demand, and the states of most countries decided to reduce interest rates but also to give some fiscal relief to bear the burden of the crisis more easily (International Labor Organization [ILOSTAT], 2022). These incentives led to an increase in inflation in many countries, including in the United States of America in the following period, and inflation could only be contained by increasing interest rates.

On the other hand, the war in Ukraine led to numerous interruptions in supply chains, but also to energy and food shortages, which further increased inflation (Ozili, 2022). Inflation rates during the period 2020-2023. years were skyrocketing everywhere in the world. Table 2

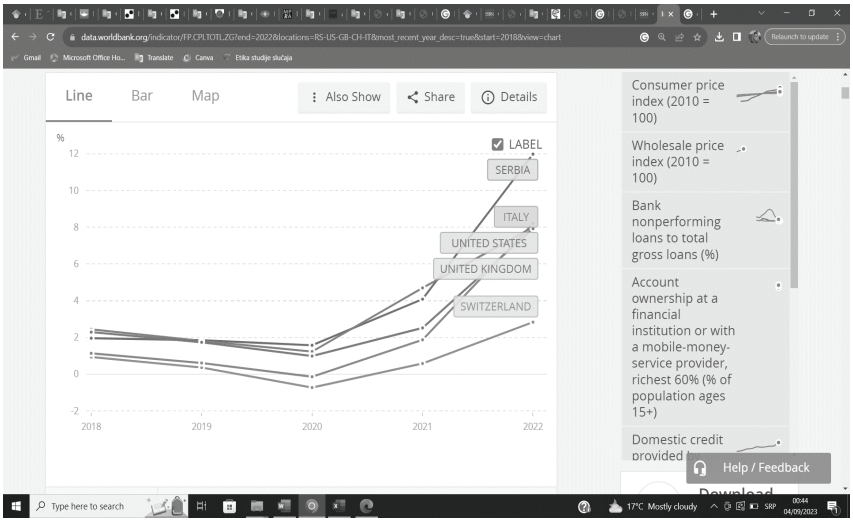
and Figure 1 show the growth of the inflation rate for the period 2018-2022. for the USA but also for other developed countries and Serbia.

Table 2: Inflation rates in the observed countries

Year	*USA*	*Great Britain*	*Switzerland*	*Italy*	*Serbia*
2018.	2,4	2,3	0,9	1,1	2
2019.	1,8	1,7	0,4	0,6	1,8
2020.	1,2	1	-0,7	-0,1	1,6
2021.	4,7	2,5	0,6	1,9	4,1
2022.	8	7,9	2,8	8,2	12

Source: World Bank, 2023.

Figure 1: Inflation rate in observed countries



Source: World Bank, 2023

From the attached data, the observed developed countries, including the USA, had a stable trend of declining inflation rates until 2020, when the crisis arose due to the depression in that period was solved by an expansive monetary and fiscal policy, and as a result, there was an increase in the inflation rate in 2021 and 2022 (Stanković et al, 2022). As for Serbia as a country that, according to the World Bank's categorization, belongs to the group of countries with higher middle incomes, the situation is the same in terms of the trend. The only difference is that in Serbia, as a less developed country, the inflation rate is higher after these events compared to developed countries.

In such circumstances, central banks found themselves in a dilemma - whether to continue stimulating aggregate demand in the manner already described or to stifle the existing inflation by increasing interest rates. However, most central banks have opted for restrictive measures to bring inflation under control. The rise in interest rates therefore caused a greater financial burden on borrowers who had to allocate more funds to finance their loans. Higher interest rates on loans caused loans to become more expensive, which

prompted many potential clients to give up taking loans. This move also led to a decrease in demand for goods and services, which slowed down economic growth and pressure on prices. In addition to these effects caused by the increase in interest rates, there were also other effects. This refers primarily to depositors' expectations that banks will not be able to service their obligations to them, especially if banks have long-term loans and securities in their portfolio. Accordingly, the banking crisis of 2023 was caused by the following causes (Ozili, 2023):

1. inadequate bank portfolio management strategy
2. inadequate interest rate risk management
3. pessimism of investors and depositors

Regulatory Measures and Crisis Management

Banking and financial crises are a constant. No matter how reliable some instruments are for crisis protection and containment, banking crises have always existed and will continue to exist in the future. However, this does not mean that we should wait for the crisis to arise because it is inevitable. It is necessary to think in the direction of better management of banking assets and risk, so as not to lose public trust.

One of the ways to overcome banking crises is deposit insurance. The first deposit insurance system appeared precisely in the USA with the establishment of the Federal Deposit Insurance Corporation (FDIC) 90 years ago, in 1933 after the Great World Economic Crisis. This instrument was designed to ensure the stability of the banking system within a country. If, due to the movement of some economic parameters, panic prevails in the public, depositors will withdraw their funds from the banking system, which will have a negative impact on payment mechanisms. This withdrawal of funds from the banking system does not refer to a single bank, but to the entire banking system on a global level, which undermines the role of the bank in the financial market (Suljić et al, 2014).

The reasons for applying deposit insurance are its simplicity and low application costs. Deposit insurance essentially performs two functions:

1. protects depositors, i
2. protects the entire banking system.

Deposit insurance performs its first function - the protection of depositors, by preventing the outflow of deposits in the event of bank insolvency. Another function - protection of the banking system, deposit insurance achieves by ensuring the safety of the financial system while avoiding systemic risk (Colaert, 2015).

In case the bank does bad business, the client - depositor doubts that the bank will be able to fulfil its obligations. If there is no protection system such as deposit insurance, depositors will be uncertain about the safety of their financial assets and the so-called "attacks" the banks. On the other hand, the security of the banking system is called into question, because the problem of one bank's operations can spread to other banks as well. Therefore, to strengthen the trust of the bank's clients and save budget funds in case of bankruptcy or liquidation, a deposit insurance system was introduced (Kostić, 2017).

In addition to these reasons, the deposit insurance system is also good because it enables the protection of small depositors who do not have adequate access to information. It is considered that large depositors are strong enough to have timely access to information about the movement of economic parameters, so they can react more quickly in case some unexpected changes occur. The deposit insurance system therefore enables the protection of all depositors by paying depositors an amount up to the coverage level in the event of bank failure.

Deposit insurance is also good for another reason, which is the reputation of banks in certain countries. A better reputation of the bank leads to a better competitive position. Therefore, banks in countries where there is no deposit insurance system are not considered safe enough, and therefore are less competitive and have a worse reputation. They do not have the capacity to attract many depositors, and therefore are not efficient enough (Tošić, 2019).

In addition to the listed advantages, the deposit insurance system has some disadvantages. The main disadvantage is precisely the asymmetry of information, that is, the potential occurrence of moral hazard. When there is a deposit insurance system, banks tend to behave riskier than when this system does not exist because banks will not bear the potential loss (Payne, 2015). This strategy is common for banks that are already in financial problems, because in the event of a loss due to risky behaviour, the bank will not lose much precisely because of the existence of deposit insurance. If these ventures succeed, the bank stands to gain a lot.

The introduction of the deposit insurance system has two opposing effects - it guarantees that the depositor's funds are safe, and the banking system is reliable, while on the other hand it removes the need for non-professional depositors to supervise the operations of banks. With the establishment of this system, everyone can go about their business - depositors not to worry that their money is trapped in the wrong hands, and banks to deal with the placement of those funds in safe and profitable placements.

Discussion and Consequences of the 2023 Banking Crisis

Like every crisis, this banking crisis also had some consequences for the economy (Ozili, 2023). We are talking about the consequences that were expected, and which are in line with the developments on the financial market

The crisis was caused by the increase in interest rates. The rise in interest rates in the US led to the tightening of financial conditions and the emergence of a banking crisis, and the crisis tightened financial conditions even more. Due to these restrictive conditions, the demand for loans decreased.

The withdrawal of deposits from the banking system, first in the USA and then in other countries of the world, led to a loss of confidence among investors who wanted to withdraw their funds invested in banks as soon as possible. Despite the assurances of the Federal Deposit Insurance Corporation and US President Biden, during the crisis there was a loss of confidence in the banking system.

The banking crisis also led to difficulties with financing the state. To finance their needs, states were happy to issue and sell long-term securities with low interest rates, which banks were happy to buy. Due to the emerging crisis, banks were not ready to

buy government bonds, which led to difficulties in the financing of governments. In that case, government bonds are bought by central banks, which in that case increase the money supply, thus accelerating the already existing inflation, which means an additional increase in interest rates.

Since the credit conditions are tightened, companies do not have the possibility of borrowing, and therefore their investments in new jobs are paused because it is not economically profitable to take loans in periods of crisis. In addition, layoffs may occur to reduce costs. As for households, in crisis conditions, they tend to borrow less from banks, there is a fear that one of the family members will lose a job, and therefore there is a decrease in consumption compared to the previous period.

The idea of full deposit insurance during a banking crisis may make sense. In this case, if there was ever a new banking crisis, depositors would not have to panic and withdraw their deposits from the banks. However, an argument that completely rejects this idea is the fact that depositors do not fully trust their governments. When such mistrust exists in the event of unfavourable developments on the financial market, there would again be panic and withdrawal of deposits despite full deposit insurance. There is also the possibility of introducing full deposit insurance, but only for large banks, but this would lead to the vulnerability of smaller banks and the migration of deposits from smaller to larger banks.

Overall, perhaps the biggest problem of all is the loss of public confidence in the banking sector. Unfortunately, the corporate social responsibility of banks after banking crises (Corporate Social Responsibility [CSR]) can also be negatively understood. One can see it as a desperate move by the banks to divert attention from the recent banking crises (Jain & Zaman, 2020). On the other hand, such moves can be positively understood to build social capital and gain public trust, all with the aim of preserving and improving the competitive position on the financial market (Azmi et al, 2021).

Based on all that has been said, it can be understood that the American banking crisis of 2023 significantly affected European banks through several key channels. First, the crisis caused a decline in confidence in the global banking sector, which led to withdrawal of deposits and a reduction in credit activity in European banks. This particularly hit banks that were already vulnerable or had higher exposures to the US market.

Second, European banks that invested in US financial instruments or had significant operations of their branches in the US suffered direct losses due to the decline in the value of those instruments and the decrease in the profitability of their US operations. These losses further burdened the balance sheets of European banks and increased the need for capital reserves.

Third, the crisis caused increased volatility in financial markets, leading to fluctuations in exchange rates and disruptions in trade flows. This volatility has made risk and liquidity management difficult for European banks, forcing them to adjust their strategies and increase their focus on stability and resilience.

Overall, the US banking crisis of 2023 caused a chain reaction in the European banking sector, highlighting the need for stronger international regulatory frameworks and better coordination between central banks to mitigate the effects of future financial shocks.

Conclusion

If it is assumed that the socially responsible behaviour of the bank will have a positive effect on its operations and if previous experiences are considered, it can be concluded that banks must limit their tendency to excessive risk taking, especially in times when it is expected that there may be banking crisis. In this way, banks protect not only their own interests, but also the interests of the entire real sector and the population. In such situations, the bank acts as a socially responsible entity that protects the interests of its stakeholders.

Seen through the prism of global banking, it can be said that the banking sector is strongly regulated precisely because of its great influence on all spheres of the economy as well as the population. However, despite the strict regulation of the banking sector, some theorists believe that bank managers who made aggressive lending decisions despite the accelerating financial crisis and global economic recession are responsible for the emergence of banking crises in the past. This happened during the Global Financial Crisis of 2007-2009. year, but also in earlier and later crises, which creates public resistance towards the banking sector.

For a long time, it was considered that monetary policy does not have a decisive influence on the emergence of banking crises. However, it was in 2023 that the rise in interest rates led to the emergence of a banking crisis, so the existing models of bank regulation cannot predict all new risks, but they need to be improved to have a better system for managing bank operations in the future.

It is obvious that movements in the real sector, starting with the pandemic and continuing through the Russian-Ukrainian war, led to shortages of certain products, but also to price growth that was higher than wage growth. These factors caused inflation in the real sector, which had to be controlled by monetary policy measures. Unfortunately, the new banking crisis and the withdrawal of deposits from the banking system have worsened business conditions, so that inflation and interest rates are still high and hinder the survival and development of the real sector.

The deposit insurance system has not fully taken root in all countries, but even in developed countries where it has existed for the last 90 years, it does not fully cover all deposits that exist in that financial system. Therefore, it is necessary to extend this system to underdeveloped countries, but also to find an appropriate level of deposit insurance in order to adequately respond to them in the event of new crises.

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