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OPEN-SOURCE INFORMATION – THE BASIS FOR BUSINESS INTELLIGENCE (BI)

INFORMACIJE IZ OTVORENIH IZVORA – OSNOVA ZA POSLOVNO-OBAVJEŠTAJNU DJELATNOST

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Abstract

The paper discusses the relationship between business intelligence (BI) and intelligence discipline based on information from open sources, better known as OSINT (open-source intelligence). The importance of the intelligence methodology – the intelligence cycle – is emphasized, which presupposes planning, systematic collection of information, its processing and analysis, and dissemination to end users. The goal is, ultimately, to make a business decision based on the knowledge. The development of BI and OSINT is discussed as well as the ideas that emerged in the 1970s when the importance of intelligence logic in the sphere of economy, and in society in general, was pointed out. Given the lack of empirical examples, the paper points out at the normative level that successful business is possible by relying on business intelligence (BI) and open-source information (OSINT), assuming the possession of analytical capacities, above all human and technological, which are capable to extrapolate the information necessary for a quality business decision from the immeasurable amount of data.

Sažetak

Rad tematizira odnos poslovno-obavještajnog djelovanja, poznatijeg pod terminom business intelligence (BI) i prikupljačke obavještajne discipline koja počiva na informacijama iz otvorenih izvora, poznatije pod kraticom OSINT (open source intelligence). Ističe se važnost obavještajne metodologije – obavještajnog ciklusa – koja pretpostavlja planiranje, sustavno prikupljanje informacija, njihovu obradu i analizu te diseminaciju prema krajnjim korisnicima. Cilj je, u konačnici, donošenje poslovne odluke na temelju prikupljenog znanja. U radu se govori o razvoju BI-a i OSINT-a i idejama koje su se javile sedamdesetih godina 20. stoljeća kada se ukazivalo na važnost obavještajne logike u sferi gospodarstva, ali u društvu općenito. S obzirom na nedostatne empirijske primjere, u radu se na normativnoj razini ukazuje kako je uspješno poslovanje moguće oslanjanjem na poslovno-obavještajno djelovanje (BI), odnosno informacije iz otvorenih izvora (OSINT), uz pretpostavku posjedovanja analitičkih kapaciteta, ljudskih i tehnoloških, koji su u stanju iz nemjerljive količine podataka ekstrapolirati informacije neophodne za kvalitetnu poslovnu odluku.

Introduction

Even though the amount of information in computer science is considered a measure for reducing the uncertainty of knowledge, in the era of information and communication technologies it is possible to talk about a phenomenon in which the amount of information is enormous that extrapolating knowledge becomes more difficult and challenging. Moreover, it becomes so

enormous that it generates ignorance. This is an information paradox where the high availability of information does not mean its usefulness. In a world flooded with information, but also misinformation, it seems that distinguishing the important from the irrelevant and judging truth and lies is becoming a crucial discipline. Although this discipline is becoming more and more challenging every day, this does not mean that information should not be collected or should be collected less. This primarily means that the collection of data from which information and then knowledge is derived, should be approached in a structured manner according to a well-established and proven methodology.

Within the newer academic discipline - intelligence studies - the intelligence cycle methodology represents appropriate framework that has a scientific and practical foundation. The application of intelligence in the business world is not unknown and new, but there are great opportunities, especially in the field of application of open-source intelligence (OSINT) to improve business[1]. This is especially the case in Croatia, as indicated by the results of previous research. When the first comprehensive survey on business intelligence (BI)[2] in the most successful companies that operate in Croatia began in October 2010, and was completed in April 2011, it was ungrateful to make assumptions about its development, knowledge and application. In 2012, the first research results were published and revealed the real situation. Systematic BI was then used by 19% of companies, and 57% of them occasionally carried out some BI activities. Companies that did not implement BI activities at all stated that the main reasons for non-implementation were insufficient knowledge of the functioning of the system, lack of competent staff as well as insufficient financial resources /**1**/. In order to check whether there are any changes, the survey was conducted again in 2017. The target population, i.e. the sample on which the research was conducted in both research waves, were companies that operate in Croatia, which are among the 1000 largest according to the *Lider* magazine[3]. Although more than five years passed between the two studies, there were no significant quantitative and qualitative changes. Only 24% of the companies that participated in the research systematically applied BI practices and had a BI department, and 50% of them occasionally carried out some BI activities /**2**/. Of course, data collection is one aspect of BI. It is not enough to gather information. Namely, given the development and sophistication of technology, it is the easiest part of the BI cycle today. Processing and analysis of collected information and its application in making (business) decisions are the most challenging part of business intelligence activities. However, it is crucial to recognize the importance of data collection and the fact that open sources are an important and almost inexhaustible source of knowledge, and that successful business today is unthinkable without open source intelligence. OSINT is in the service of BI and represents its essence. These two studies also showed that there is a very narrow view of business information. The focus is on products, customers and competition, while broader aspects of business, which in recent years, and especially months, have proven to be crucial, have not been a priority for companies. These are the data, i.e. information about security situation, general political situation and socio-cultural aspects /**1**/, /**2**/. The fact is that most of the information needed to make decisions is publicly available, so it is reasonable to ask where the key problem lies. Lewis M. Branscomb /**3**/ claims that "wrong decisions (...)more

[1] The paper uses the term open-source intelligence, but also the abbreviation OSINT.

[2] The paper uses the phrase business information management system, business intelligence, but predominantly uses the generally accepted phrase business intelligence as well as the abbreviation BI

[3] Both waves of research were conducted by a group of researchers from the Department of Sociology, Faculty of Humanities and Social Sciences, University of Zagreb in collaboration with the business weekly Lider. The target population were the largest companies operating in the Republic of Croatia, the list of which was published in the business weekly Lider. In the first wave of research, the list of companies was published in June 2010 in a special supplement "1000 najvećih" which was published with the 247th issue of the business weekly Lider. In the second wave of research from 2017, the database of "1000 najvećih" was published in 2014 in a special issue of the business weekly Lider. It is a traditional scale that Lider magazine has been publishing for many years, and the last one was published in September 2021.

frequently arise from the failure to use information that was, in principle, available, than are caused by current limitations in human knowledge", which is one of the assumptions of this paper. This paper seeks to show that successful business is possible by relying on business intelligence (BI), i.e. open source intelligence (OSINT) But the assumption is the possession of human and technological analytical capacities able to extrapolate information necessary for a quality business decision from a huge amount of data.

Business-intelligence activities - the basis for economic development

One of the founders of the idea of the necessity of using knowledge (information) in the development of national economies and social progress, Stevan Dedijer, spoke about *social intelligence*. Given the fact that he was acquainted with the functioning of intelligence systems, whose basic principle is gathering information and turning it into knowledge for decision-making, Dedijer believed that same logic can and should be implemented in the economic and wider social sphere. Dedijer wrote his first work on social intelligence, global social intelligence, in 1972 /**4**/. Many other authors agreed with his idea. Thus, in 1987, along with Nicolas Jéquier, Dedijer published the editorial book *Intelligence for Economic Development: An Inquiry into the Role of the Knowledge Industry* /**5**/. It is a collection of essays in which several authors discuss intelligence activities in the field of economy, i.e. the importance of gathering information and knowledge as a basis for making decisions necessary for the overall social development. Dedijer talks about *social intelligence*, which is highly used by industrialized countries, emphasizing that this is the way for developing countries as well. Jéquier and Dedijer /**5**/ consider intelligence as an "instrument of development". The authors state that practices such as scanning the economic and political environment in order to identify problems and threats, opportunities or challenges, are constantly used by developed countries, but are often given other names such as "market analysis", "technological forecasting", "long-range planning", etc. /**5**/. Therefore, the collection of information and its transformation into knowledge, as seen by Jéquier and Dedijer, is an important strategic determinant of national economies, and then economic entities as their components. Shortly after Dedijer launched the idea of *social intelligence*, a new phrase was coined in the United States – *business intelligence*. It was first used in 1989 by Howard Dresner, an analyst at Gartner Inc. Just like Dedijer, Dresner considered that business intelligence is an essential instrument for successful business. Thus, the prerequisite for business success, i.e. economic and overall social progress, is the collection of information with the aim of making quality decisions. However, business intelligence was not a novelty discovered by Dedijer and Dresner since such practices have been known for a long time. In the paper "Tracing the Origins of Competitive Intelligence Throughout History" Juhari and Stephens /**6**/ point out that these practices were used in China 500 years before Christ in order to secure an imperial position in various types of industries. The Roman Empire, except for military conquests, used intelligence activities for trade and culture. The Japanese Meiji Restoration in the 19th century relied heavily on business intelligence practices. Colonial powers such as England, the Netherlands, Portugal, Spain and France also applied business intelligence practices. The Ragusian Republic used intelligence activities to pursue its own economic interests /**7**/. Globalization and the development of information and communication technologies have made modern business without business intelligence practices unthinkable.

From a brief historical cross-section on the origin of the term business intelligence, the existence of terminological disagreement is evident. Dedijer used the term social intelligence, Dresner business intelligence, the term competitive intelligence appeared quickly afterwards as well as many others such as economic intelligence, market intelligence, market monitoring, competitor intelligence, corporate intelligence, knowledge management, etc. /**8**/, /**9**/, /**10**/, /**11**/. Terminological hyperproduction has also influenced the understanding of concepts. The operational term used in this paper, business

intelligence, does not have a generally accepted translation in the Croatian language, neither in the professional community nor in the general public. However, in the last ten years, the professional and scientific community has shown interest in the topic, which is visible in research and publications /**12**/, /**13**/, /**1**/, /**2**/, /**14**/, /**15**/, /**16**/, etc. There are more definitions than concepts and different authors' perspectives are very frequently the reason. According to Luetić /**17**/, some view business intelligence as a process, others as a concept, some as a system, discipline, strategy, way of business thinking, managerial philosophy, set of technical solutions, value-added product, intelligence activity and so on. One of the leading consulting companies – *Gartner Inc*., in its glossary (*Gartner Glossary*) states that "analytics and business intelligence (ABI) is an umbrella term that includes the applications, infrastructure and tools, and best practices that enable access to and analysis of information to improve and optimize decisions and performance" /**18**/. In previous comprehensive research on the application of BI in Croatia, the phrase "business information management system" /**1**/, /**2**/ was used. The first research proposed an operational definition according to which BI is "business intelligence in the business world that is planned, organized and implemented by business entities, whereby it refers to a process of legal collection of public and publicly available data by ethical means, data conversion into ready-made business intelligence analyses (business knowledge) for the purpose of providing support to managers in making and implementing the best possible business decisions to maintain their position in the business environment, avoiding any threats and ultimately for the overall qualitative progress" /**1**/. This definition is also operational in this paper as it clearly describes the BI process and points to "public and accessible sources" as part of the BI. It is important to indicate that the logic of intelligence is inherent in BI and is best reflected in the methodology of the intelligence cycle. These are practices that are very well known within the national intelligence, but the idea of business intelligence practices is to be applied in the sphere of economy, i.e. that business entities base their activities on knowledge derived from collected and processed information. Although there are discussions in intelligence studies about what the intelligence cycle is and what its stages are /**19**/, the prevailing opinion is that the cycle begins with a request for intelligence, followed by planning and data collection, processing and analysis and finally dissemination to decision makers who act based on the obtained findings /**20**/, /**21**/. In the sphere of economics, business entities are those that take over the patterns of behavior of state intelligence. Through processing and analyzing, they turn data into knowledge which, on the one hand, indicates business opportunities and, on the other hand, threats. Thus, relevant, accurate and timely information becomes the basis for decision-making. In the early 1970s, Dedijer said that highly industrialized societies were actually "information economies" /**5**/. Research later showed that the economies of countries with systematic application of business intelligence practices (USA, UK, Germany, Brazil, Finland, Belgium, the Netherlands, etc.) and/or with inherent information-based action at the level of society as a whole (Israel, Japan, France) are the most successful in the world /**8**/, /**22**/, /**23**/, /**24**/. According to Jéquier and Dedijer /**5**/, 90 percent of the information necessary to make (business) decisions is open-source information. But it is important to emphasize what both Jéquier and Dedijer point out, the fact that information is publicly available does not mean that it is free. The use of information from open sources presupposes years of work in order to find relevant information, monitor new information and develop appropriate communication channels. The clogging of communication channels and the immeasurable amount of publicly available information require great knowledge and technical skills, but above all human skills, because the tendency to collect huge amounts of often outdated or irrelevant information is one of the "typical pathological syndromes of intelligence" /**5**/. In order to minimize these phenomena, the collection and processing of information requires a clear methodology.

Open-Source Intelligence - (OSINT)

Open-Source Intelligence (OSINT) is intelligence gathering discipline with all the characteristics of intelligence cycle, which involves planning, systematic collection, processing and analysis, and ultimately dissemination to end users. The information or knowledge obtained in this way is the foundation for making quality decisions, in this case business decisions. One of the most important and prolific authors in the field of OSINT, Robert David Steele /**25**/, defines OSINT or open intelligence sources as "unclassified information that has been deliberately discovered, discriminated, distilled and disseminated to a select audience in order to address a specific question"[4]. According to Steel, OSINT provides a solid foundation for other disciplines (HUMINT, SIGINT, IMINT, etc.)[5] and when applied systematically, OSINT products can reduce intelligence gathering requirements from classified sources by limiting requirements to only those issues that open sources could not answer. Numerous other authors also emphasize the importance and usefulness of open-source intelligence. Thus, according to Hulnick /**27**/, intelligence from open sources is "a key factor in intelligence activity", and 70 to 80 percent of intelligence is contained in open sources. Paul Wallner /**26**/ agrees with such estimates, while some authors estimate up to 90 percent /**5**/, /**28**/, /**29**/. There are also those who claim that more than 90 percent of intelligence comes from open sources /**30**/. One of the authors who emphasizes the importance of open-source intelligence in business intelligence is Libor Benes /**31**/, who has gone pretty far in the thesis of his paper "OSINT, New Technologies, Education: Expanding Opportunities and Threats. And the New Paradigm". He argued that the impact of new technologies on society and OSINT represents an opportunity to strengthen American leadership in the world. For Eliot A. Jardines /**32**/ OSINT is a "source of the first kind" within the intelligence world given its ubiquity and wide-ranging ability. Jardines connects the use of open sources for intelligence purposes with the advent of the printing press, but also states that it is possible that the history of the discipline dates back earlier because various royal proclamations, laws, decrees, trials, arrests from ancient times actually served as OSINT. Gibson /33/ links the origin and institutionalization of this discipline to 1938 and the creation of *British BBC Monitoring Service*, now *BBC Monitoring*, its equivalent in the US was *Foreign Broadcast Monitoring Service* which appeared in 1941, later called *Foreign Broadcast Information Service* (FBIS), and today also known as *Open Source Center* (OSC). Hassan and Hijazi /**30**/ state that "there is no specific date on when the term OSINT was first proposed; however, a relative term has probably been used for hundreds of years to describe the act of gathering intelligence through exploiting publicly available resources" while in recent history OSINT was introduced during the Second World War as a tool of intelligence communities, and later became important in the non-governmental sector, corporations and the like. Given the development of information and communication technology, which is crucial for open sources today, the development and specifics of OSINT can be considered in the categories before and after the advent of the Internet, since today we are all consumers and producers of information. Speaking of information sources, there are several different classifications and views on what intelligence from open sources can be. Steele /**25**/ divides open sources into traditional media sources, commercial online premium sources, other niche commercial online sources, grey literature[6], overt human experts, commercial imagery and

[4] Steel's definition is one of many OSINT definitions. Dokman /19/ cites a dozen definitions of OSINT and states that the main feature that distinguishes intelligence from open sources and information from other sources is that content from open sources is available to all entities (state intelligence, business intelligence, individuals, terrorists, groups and other non-state actors, etc.), almost free and very easily accessible, but emphasizes that there is publicly available information that is not free.

[5] HUMINT (human intelligence) is intelligence discipline where data are collected through human sources, SIGINT (signal intelligence) is a discipline in which data are obtained by intercepting signals or recording devices, IMINT (image intelligence) is a discipline in which data are collected via satellite photographs or a camera.

[6] Grey literature includes product brochures and various case studies, presentations, symposium abstracts and minutes, pamphlets, professional newspapers, newsletters,

geospatial information, and finally the Internet and the *World Wide Web*, which includes e-mail and voice calls. A more recent and much more relevant classification was offered by the authors Hassani and Hijazi /**30**/ according to which the first category of sources is the Internet (forums, blogs, social networking sites, video-sharing sites like *YouTube.com*, *wikis*, Whois records of registered domain names, metadata and digital files, dark web resources, geolocation data, IP addresses, people search engines, etc). The next category is traditional mass media such as television, radio, newspapers, books and magazines. The following is a category of specialized journals, academic publications, dissertations, proceedings, company profiles, their annual reports, news, employee profiles, and resumes. The fourth category includes photos and videos with metadata, and finally geolocation information. A very specific five categories classification of OSINT was offered by Qusef and Alkilani /**34**/ who analyze OSINT from the perspective of counter-terrorism. According to them, one source is "articles", which include academic and journalistic works. Second is "media", which include information attacks and interviews. The third source is "terrorist deliverables", which includes booklets and books. The Internet is the fourth source, and it includes websites, forums, blogs. The fifth are "reports" from international agencies, courts and law enforcements, governments and the NGO. Regardless of which division we are talking about, this is public information available to everyone and can be obtained by legal means, because any unauthorized data collection is not OSINT. For example, publicly available profiles on social networks contain information that may be part of OSINT, but unauthorized access and hacking of profiles or any website is not OSINT. Of course, public availability does not mean that information is free. The best examples are databases of scientific journals as well as various registers that include information important for business. Furthermore, the information collected is not intelligence in itself, but it becomes so after verification, analysis and use. Action, which is an important element of intelligence, is what separates OSINT from research of another type, such as scientific, journalistic and similar. Open-source intelligence is available to all and is of interest to businesses, while classified information collected through human and technical sources is characteristic of national intelligence. In business, the attempt to obtain classified information belongs to the sphere of industrial and economic espionage that has a long history which Brian Champion /**35**/ speaks about in his work from 1998 – "A review of selected cases of industrial espionage and economic spying, 1568 -1945". According to Champion, as part of business espionage activities, companies use purloined information about competitors, steal prototypes or models, rummage through trash, etc. Such activities are not the subject of either OSINT or BI.

OSINT in the service of BI

The key question about the relationship between OSINT and BI is not whether and why to use information from open sources in business intelligence, but how to use it. The following data will prompt any analytical mind to think about how much open-source information is usable for making business decisions. Approximately 350 million photos are published on *Facebook* every day, and over 500 million stories are created on *Instagram*. More than 200 million companies had profiles on *Instagram* in early 2022. There are 500 million tweets on Twitter every day and 500 videos are posted on YouTube every minute /**36**/. These are just few statistics[7] about the most famous social networks that make up a large part of open and

patent documents and technical reports, illegal newspapers, etc.

[7] Although in the field of intelligence studies the data collected on social networks have its own name - SOCMINT (*social media intelligence*), in this paper the focus is on the term OSINT. SOCMINT or intelligence from social media is a form of sub-discipline of OSINT. The relationship between OSINT and SOCMINT is explained by Dokman / 19 /, who points out that social media is intended for wide communication with users and for the exchange of information, images and videos between two or more users. Dokman also states that sometimes such content is not publicly available and is visible only to participants in certain communities within social media. Here he / 98 / points out that "the collection of publicly available information through social media becomes limited in certain circumstances, but the

publicly available information that could be used for (business) intelligence purposes. With the advent of the Internet, the amount of publicly available information, but also misinformation and inaccurate information, has increased so much that OSINT art is far more complex today than it was before the Internet. But decision-making in the business world is impossible without OSINT. OSINT was therefore referred to and sentenced to BI, and *vice versa.* This is also pointed out by Ponder-Sutton /**37**/, according to whom the use of intelligence from open sources and the derivation of predictions from them is the basis not only for intelligence activities of states, but also for business management. This is what Matey /**38**/ claims, pointing out that private sector businesses, in particular small- and medium-sized enterprises (SMEs), can use intelligence to reduce the uncertainty of their operations and improve their decision-making processes in an increasingly complex and changing environment driven by a multitude of conflicting forces and interests. The goal of every business entity is achieving and maintaining competitive advantage. National economies also strive for competitiveness, so business intelligence is indispensable for achieving these goals. Intelligence from open sources that can be used for business purposes is everywhere and easily accessible, and the basic and inexhaustible source of (business) intelligence today is the Internet. There are 4.93 billion Internet users in the world, 10.07 billion devices connected to the Internet, 5.24 billion pages indexed on *Google*, 3.8 billion active users of social networks and 4.5 million terabytes of traffic generated daily on the Internet pages /**39**/. But the value of intelligence product is not measured by how difficult it is to get to, but by how it responds to the needs of the end user. With the vast amount of data and information, it is important to select those that can be useful and exploited. These are the ones that become intelligence. Over time, OSINT analysts have developed various tools and methods to leverage the information available on the Internet. Without it, the job of OSINT analysts would be like looking for a needle in a haystack, which is often a metaphor used for OSINT /**40**/, /**39**/. Key and valuable tools for OSINT researchers are search engines like *Google*, *Mozilla*, *Bing*, *Yahoo* and others. There are also special search tools that help OSINT investigators automate data collection, create graphical links, and visualize relationships between individuals and topics. Some of them are Maltego, Mitaka, SpideFoot, BuiltWith, Shodan, TweetDeck, Intelligence X and others /**41**/. Some of the tools collect information from the internet of things like cameras, smart TVs, some are used to select real-time content based on keywords, content types, locations, etc. In addition to various tools and technological solutions for collecting, there are various techniques for verifying the collected material before it is included in the analysis. Fleisher and Bensoussan /**43**/ suggest checking the following elements: 1) Subject – How relevant the data are to the subject of the research?; 2) Currency – How recent was the data or information created?, Is it first-hand or second-hand information?, Is it current enough?; 3) Reliability – What kind of information is included?, Is the content fact?, Opinion?, Does the source offer the reference?, Can the source of information be trusted?, How reliable does it grade out?; 4) Authority – Who is the author/creator?, Are they named?, Anonymous?, Who is the publisher or sponsor of the source?, Are they reputable?, Is it educational?, Informational?; 5) Point of view/Purpose – Does the source allude to or explicitly share their assumptions?, Does the source explain their purpose for sharing the data/info?, Might there be any reason for deception to be involved?; 6) Ease of Access and Availability – Can other sources be accessed quickly?, Does the source speak the right language?, What is the financial opportunity and time cost to access the source? Gibson /**42**/ proposes a list of five criteria according to which it is necessary to check the collected OSINT matter, and that is: 1) Authority – are origins of OSINT held in high regard by peers or consumers?; 2) Accuracy – For reference, how reliable is the OSINT source, and can it be checked or evaluated?; 3) Objectivity – Is the OSINT root in some manner distorted?; 4) Timely – Is the

substrate could be collected by joining certain groups and through social engineering, but then this *modus operandi* no longer corresponds to the idea of collecting open and information that are available to all."

OSINT root timestamped, date-stamped, or geolocated?; 5) Relevancy – How essential is the OSINT element? Each OSINT can be and is a part of BI when the information collected is used in business decisions. Therefore, any publicly available information collected and used in a business context is business intelligence. It can be a posting on social media in any form (textual, visual, audio), it can be information published on any website and in any form, it can be news broadcast on a TV or radio station. It can be information obtained from a brochure collected at the fair, it can be scientific work of any type and so on. It is an inexhaustible source of data from which OSINT, i.e. business intelligence, can draw information.

There is very little scientific research and work on the use of OSINT for business purposes, although the usefulness of OSINT for business is very often mentioned in papers in the field of intelligence studies. But it is just a mention. One of the few works that deals exclusively with the use of intelligence in business is that of Gustavo Díaz Mateya from 2013 – "The Use of Intelligence in the Private Sector" /**38**/. Although the paper connects intelligence and business and points to open sources, nowhere does it explicitly talk about OSINT. Qusef and Alkilani /**34**/ talk about the application of OSINT in various sectors, but still emphasize that it is mostly used by large corporations, banks and various sectors that gather information and conduct market analysis for decision making, strategic advantage and business security. In the review paper on OSINT – "Open Source Intelligence and its Applications in Next Generation Cyber Security - A Literature Review", authors Yogish and Krishna /**44**/ give a systematic overview of a number of papers on OSINT. Some of the mentioned papers partly thematize OSINT and its application in business. For example, Hayes and Cappa /**45**/ talk about the possibility of using OSINT in risk assessment in companies, and a similar topic of resilience in companies and the usefulness of OSINT is dealt with by authors Wiradarma and Sasmita /**46**/. Fleisher /**47**/ gives a conceptual framework for how publicly available data influences competitive intelligence operations in the field of business, especially marketing. Many papers on OSINT deal with the issue of cyber threats, but not specifically from a business intelligence or business counterintelligence perspective /**48**/, /**49**/, /**50**/. The direct connection between OSINT and business can therefore be found in numerous professional papers and in various specialized media. On the *Forbes* website, Popel published an article in early 2022 entitled "OSINT: The New Big Thing In B2B Business" where he clearly illustrates how OSINT can help improve the business process, including customers, suppliers, competitors and the brand. Popel argues that OSINT is rapidly becoming a widely used secret weapon in corporate competition and that its effect on the B2B sector has been particularly remarkable and can be compared to the impact LinkedIn had on the sector when the business social network first emerged. Popel concludes interestingly /**51**/: In this era of opportunity, it will either be you who uses OSINT to get ahead of your competitors or vice versa. Very specific examples of connecting OSINT and business can be found on specialized websites. These are often the pages of consulting companies that offer solutions for the use of OSINT for BI, and various OSINT tools for *business risk intelligence*[8] are proposed. There are also specialized blogs that talk about the wide possibilities of applying OSINT, for example, companies can conduct various checks of employees, management, shareholders, customers, associates, etc. /**52**/, /**53**/. Experts also leave their comments on various social networks such as *LinkedIn*, pointing out that OSINT is a good way to find out, for example, through social media what customers like, what bothers them, what the public thinks about the brand and so on /53/. Counter-terrorism expert Maria Efremova /**54**/ claims that OSINT "could be useful to almost every company" because "listening to what people say about the company at any time will give the information and time it takes to detect and mitigate on the one hand, risks, but also to respond quickly to new business opportunities on the other hand". Specialized sites also offer training on how OSINT can

[8] URL: https://www.echosec.net/blog/osint-tools-and-techniques-for-business-risk-intelligence.

help find employees /**55**/. Some experts give instructions on how to use OSINT for marketing activities and how tracking the pages of competitors on social networks can help identify messages and create such marketing strategies that differ from most others and that set the company apart from other competitors /**56**/. OSINT is also used for business counterintelligence (BCI), not just intelligence. Counterintelligence activities deal with identifying and combating security threats to organizations and employees, and the first step is to detect a malicious actor and reconnaissance and gather information that ultimately turns into intelligence based on which to act /**57**/. Counterintelligence business also means that careful attention is paid to what information about the company is publicly available so that it is not misused by the competition, i.e. that more than what is necessary is not presented. The lack of scientific research and case studies is understandable to some extent. Any company that has achieved success based on good BI using OSINT has no interest in sharing its "recipe" publicly. This would be, for example, as if the security and intelligence services of states "boast" about the way in which they have achieved certain successes. One thing is for sure, every successful national economy, like every successful company, cannot exist without OSINT, i.e. BI, and this is shown by the previously presented data. For now, examples of good OSINT and BI can only be detected by chance and try to give some rough conclusions. One of the most famous and successful brands in the world, *Apple's iPhone* launches a new mobile phone model at a certain time every year. The chronological analysis of open sources on the release of new *iPhone* models shows that promotions typically take place in September. To competing companies, this is a sign for preparing their new products around that period and for calculating whether to launch their new product after or maybe before, depending on what they estimate is a better business decision. Such and similar OSINT analyses can be conducted for various other companies and brands. In turbulent security and political circumstances, companies must have all radars on in order to detect threats to business in a timely manner or take advantage of the opportunities provided. The recent situation with the war in Ukraine has brought many companies in Europe and the world into unpleasant situation. Those who have not conducted business intelligence analysis and predicted different scenarios based on publicly available sources are certainly facing major challenges. For many of them, it will be an irreversible path or the end of business. Those who had different scenarios foreseen, one of which was the war conflict, are certainly better prepared for this situation. Also, relying on OSINT can help companies that have stumbled to overcome the crises in which they find themselves. Speaking about OSINT and business, Hassan and Hijazi /**30**/ state that corporations use OSINT resources to "to investigate new markets, monitor competitors' activities, plan marketing activities, and predict anything that can affect their current operations and future growth" and add that companies also use OSINT for some other purposes such as data leakage prevention and protection against cyber threats and cyber risk management. OSINT in business predominantly focuses on information "from outside", i.e. information that is not part of the internal processes of the business entity, but can also use its own information for better decision making. Most non-confidential inside information is not always available and known to those who should make knowledge-based decisions. Some of the world's most renowned consulting firms, such as *Deloitte* /**58**/ use OSINT to gain a better insight into customers. For example, some background information such as sources of wealth, political connections, warnings about money laundering, organized crime, fraud, corruption, bribery, tax evasion, etc. Furthermore, similar information about business partners could and should be requested through OSINT as well. It is also possible to monitor the movement of property values, CV checks, history of fraud, lawsuits and so on. As a rule, all above mentioned information is publicly available and can be very useful in business. The key question is whether and to what extent companies are trained to exploit this large knowledge mine for their business. Given the large amounts of information generated every second, it is

necessary to develop and advance in the field of big data, data and text analytics and artificial intelligence in order to use and exploit public and publicly available data and this is a trend that is noticeable in the last ten years /**59**/. Technical equipment, but above all human capacity, is key to the successful synthesis of OSINT and BI and the use of publicly available intelligence for business purposes.

In conclusion: advantages and disadvantages of using OSINT in BI

A review, primarily of professional literature, indicates multiple possibilities and benefits of applying OSINT in BI. OSINT is very "accessible, ubiquitous, and valuable" /**60**/ so any investment in people and technology that will select knowledge from information, and which will then be used to make business decisions, is an investment that pays off very quickly. In a short time it is possible to collect large amount of information (knowledge) that is free, although sometimes open sources can be charged. Given the globalization and economic connectivity, businesses using OSINT can access information about competitors, partners, consumers, etc. anywhere in the world at any time and in any language. The security of those who gather information necessary to make business decisions is high. They are not exposed to any dangers. It should be mentioned that when trying to access data, i.e. information that is not publicly available, the researcher and/or analyst enters a legally prohibited zone, i.e. a black zone that is not part of business intelligence. OSINT used in BI includes only publicly available data. OSINT as a discipline is ubiquitous and can obtain huge amounts of information that is produced especially in the information age and thus "saves lives, time and money" /**25**/, which is extremely important for businesses. If we think about negative aspects of OSINT and its application in BI, the first thing that comes to mind is a large amount of data, i.e. "looking for a needle in a haystack", emphasizing that the haystack is getting bigger every day. According to some estimates /**61**/, by 2025 there will be 175 zettabytes[9] of data in the global data sphere. Also, in addition to the amount of information, which can be both an advantage and a disadvantage, there is a large amount of misinformation and false information that is sometimes not easy to discern. This fact is considered to be the biggest challenge in the area of OSINT /**62**/. Information and knowledge are the power that brings competitive advantage to businesses. OSINT and BI connections, i.e. the use of intelligence from open sources for business decision-making, generates knowledge that is the basis of quality business decisions. Almost ninety percent of information about someone or something is publicly available. In order to obtain necessary information and knowledge from the unlimited amount of data, it is necessary to use intelligence cycle methodology. The collection of data relevant for a specific case, valorization and turning that data into information, its processing and analysis, and ultimately delivering that knowledge to decision makers is the logic of the intelligence cycle and it is valid in both OSINT and business intelligence. Optimizing the use of available resources and their capabilities is the basis of successful OSINT and BI. Investing in technology, and above all in human resources, is the prerequisite for success of a business entity. Although the profession is faster than scientific community when it comes to analyzing the possibilities of OSINT and BI, the role of scientific community is not negligible. First of all, it is necessary to investigate the reasons for (non) application of BI and OSINT within business entities and at the level of national economies. And on a scientific basis, it is necessary to point out the advantages and opportunities that BI and OSINT offer. These insights can help achieve what Dedijer called *social intelligence*, that is, social knowledge based on information, which is a prerequisite for social development. Without the intelligence logic behind social intelligence, it is difficult to achieve the desired economic or social progress. Knowing to anticipate, anticipating to seize opportunities and avoiding or minimizing dangers is the basic idea of BI, and OSINT is the *conditio sine qua non* here.

[9] One zettabyte (ZB) has 1 099 511 627 776 gigabytes (GB).

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