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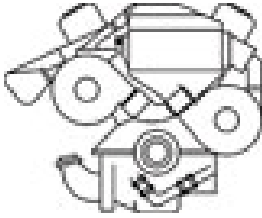
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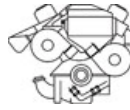
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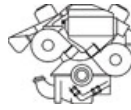
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WALTER BLOCK ABOUT HIS STUDENT PUBLICATION PROGRAM

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JEL Category: **Z0**

Abstract

Over 150 of my undergraduate students' term papers have been published in law reviews or refereed scholarly journals in economics, politics, philosophy, and other such venues. This is the story of how this program started, and how it is implemented. Hopefully, this will encourage other instances of similar faculty-student cooperation.

Keywords: *Publications, undergraduate education, co-authorships, publishing.*

MY UNDERGRADUATE STUDENT PUBLICATION PROGRAM

I have been teaching at the undergraduate level since the late 1960s, over 50 years ago. My typical practice has been to give the students a midterm, a final exam, maybe a few quizzes, and a term paper (due on the day of the final). For many years I would mark the term papers, and then forget all about them.

Then, in 1996, I got religion. I began to heavily edit these essays, add material to them, and get them published as co-authored articles. I would place them in wide circulation non-scholarly periodicals.

Let me now explain how I got "into" my present practice of getting my undergrad students' term papers published in refereed journals and law reviews.

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As you may know, when you send a paper for publication to a refereed journal in economics, philosophy, or political science (the fields with which I am most familiar), you are only supposed to send it to one editor at a time. However, law reviews work differently: you are allowed to make multiple submissions to them.

Well, one day, in 1999, I sent out not a student coauthored paper, but one of my own, to a bunch of law reviews. Journal A accepted it for publication. Two weeks later, journal B also wrote me an acceptance letter. I was about to send the latter journal a letter declining publication with them. However, I noticed a bunch of student term papers just sitting on my desk. The "lightbulb" went off on top of my head. I of course declined publishing that paper with journal B but wrote them to the effect that since they liked the paper of mine, they had accepted (which I could not publish with them since I had already accepted A's invitation), maybe they would be interested in publishing some of these term papers I was about to send to

my usual sources. I did just that. When law review B accepted one of these papers, I was amazed. And I was off to the races. I was astonished at this success and have continued this process ever since. There are now over 150 publications in refereed journals and law reviews that started out as term papers for my courses.

In my early days of term paperdom, if I could use that expression, I would have a two-step process. Right after the midterm exam, the student had to give me the title of a proposed term paper, and a 100-word description of it. Nowadays, I utilize a five-stage procedure. That is still step one. But at present, I am far fussier about what I want. Here is a letter I send to my students in this regard:

I have had a modicum of success in getting student term papers, of the sort you are about to write, published in refereed journals and law reviews. See attached. Doing so would be a feather in your caps, and mine too since I'll be editing and co-authoring them with you. (This is one of criteria used in academia to hire and promote professors; so, an undergraduate effort published in this venue is unusual). I have had over 150 successes so far, and see no reason why I, we, should not succeed this semester as well. I certainly can't promise this to all of you, but I'm confident that I will succeed in this regard with at least some of you.

Please send me the title of your prospective paper, and a 100-word description of what you intend to write about.

If you take a peek the authors in the attached, you'll note that I'm the co-author on all but a half dozen of them. Why? This is because a few of them are direct critiques of my publications, attacks on my views, as expressed in my books or articles. See attached on that too. That's acceptable. Your grade will not depend upon whether your paper agrees or disagrees with my viewpoint. But obviously, I can't co-author a paper that disagrees with my perspective, unless I'm convinced by you to change my mind. You'll have a better chance of getting published if you write something I can agree with, and I coauthor the paper with you. Why? This is because I've been

around the block (so to speak) a few times, and, hard as this may be to believe, there are some editors who actually like to publish what I write.

If I add to your paper and co-author, it with you, it has a far better chance of being published. But remember, I'm a free enterpriser, a libertarian.

So, if you want to boost your chances of publication, please choose a topic about which we both agree. On the other hand, if you want to stick to your perspective which disagrees with mine, that's entirely up to you. There will be no penalty for doing that. Indeed, I'll still help you get published, as I did for other student term papers with which I disagreed, see Sayers for example.

If you want to co-author your paper with me, and I agree to do so, I'll heavily edit it, and add material to it. But you must sign and send this letter to me:

(Date)

Dear Dr. Block:

I hereby give permission that you edit my term paper for the purpose of seeking publication for it in a magazine, or as an article in a refereed scholarly journal. I realize that, at your discretion, you may add/subtract material to it and co-author it with me, and/or may combine it with the term paper(s) of other students, into a multiple authored paper. I realize that the final editorial decisions will be yours.

Yours truly,

Your signature

(Print your name)

So much for step two.

What is step three? Instead of a due date for the term paper on the last day of class, or on the day of the final exam, I require a first draft at least a month before. Then, I divide the class into groups of two, and have them edit each other's papers. For example, student A edits student B's paper, and B edits A's paper. (If there are an odd number of pupils in my class, then X edits Y's paper, Y edits Z's paper, and Z edits X's paper). I send them my editing instructions, which include the statement: don't be "nice" to the paper you are

editing. Your job is to improve it. Constructive criticism is the order of the day. I'll give you a good mark as an editor if you are helpful to your author. On the other hand, if you get a perfect paper (ha, ha), leave it alone. I give the students a week to ten days to accomplish this task.

Step four is when I mark up the edited versions of the papers. Ostensibly, I am criticizing, only, the editors of each. But the authors see this as well, and, hopefully, improve their term papers, dues, as before, on the day of the final exam.

Step five is when I peddle these papers to refereed journals mostly in economics, but sometimes in philosophy or political science, and in law reviews.

I am intent on getting these papers published, no matter how many rejections I get. My motto for rejections is "Pearls before swine" and I keep going until I get a hit. Perseverance is my middle name, which I think accounts for a lot of success I've had with my student publication program.

Remember, these are undergraduate students, so success is a big feather in their caps.

Nowadays, there is a lot of emphasis of student teacher interaction on the part of administrators. I've garnered quite a bit of credit for this program of mine, since it is a very good way to interact with students: teaching them a bit of my craft in an unusual way.

Note

The complete list of published papers that resulted from students' seminar papers is displayed at the web address: <http://www.walterblock.com/published-students/>

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A REVIEW OF BLOCKCHAIN APPLICATION IN LOGISTICS AND LAST-MILE DELIVERY

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JEL Category: **M15, O32**

We dedicate this article to our late friend and colleague, Professor Sergey Kirsanov, who left us too soon.

Abstract

Due to the ongoing arrival of individuals, large urban areas are expanding while the daily life within them becomes increasingly demanding. These cities' authorities confronted many challenges in providing necessities for their citizens, such as water and food supply, energy, public transportation, road infrastructure, healthcare services, waste management, recycling, and storage facilities. Cities embrace novel technologies and innovative approaches to cope with these evolving circumstances. Cyber-physical systems, digitization, networking, cloud computing, the Internet of Things, and blockchains are valuable tools that enable the efficient functioning of smart cities. The subject matter of this article is very complex and covers several disciplines, such as management, transport, and information technologies. Few have mastered the necessary knowledge in all these areas. The authors wish that this multi-dimensional presentation of the current situation will be helpful to those who deal with the organization of life in cities, logistics, or the application of information technologies in business organizations, but also ordinary citizens who are not yet familiar with these problems. The article should allow the reader to see the complexity of last-mile delivery and encourage it to use its potential to get involved in solving this problem.

Keywords: Supply chain, blockchain, logistics, city logistics, last-mile delivery, fraud.

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1 INTRODUCTION

In recent years, blockchain technology has been of great interest to a wide range of people interested in cryptocurrencies. Not knowing what technology is, many have tried to make money by trading cryptocurrencies. When cryptocurrency trading declined, enough people had already acquired the necessary knowledge to be inspired and able to try to find new possibilities for the practical application of this technology.

How blockchains work and how SMEs can create and use them are shown in (Cekerevac & Cekerevac, 2022). In (Cekerevac & Cekerevac, 2023) (Cekerevac, Prigoda, & Cekerevac, 2022,

May 25), and in (Cekerevac, Prigoda, & Maletic, 2018), the authors discussed different blockchain applications. There is considered synergy between blockchains and the Internet of Things. Therefore, we will not discuss the details of blockchain technology here. We want to point out that blockchains are decentralized platforms where each stakeholder participates by adding data to the chain and can see all changes in the chain. Blockchain is very reliable and resistant to external disturbances. Each blockchain has its ledger, a system that keeps records. Blockchain ledger contains a chronology of all transactions in the form of cryptographically verifiable parts called blocks and linked together (see Fig. 1) (Cekerevac, Prigoda, & Maletic, 2018)

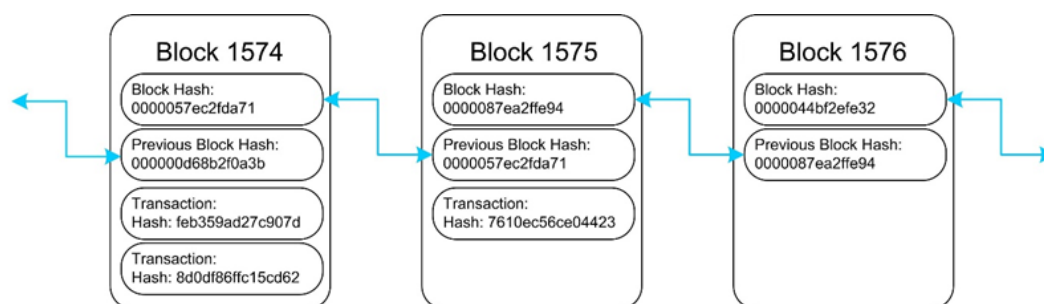


Fig. 1 An example of three consecutive blocks in the blockchain

Source: (Gupta, 2017)

Blockchains can be public, private, or consortium. In what category specific blockchain will be classified depends on who can participate in the network, validate blockchain entries, and keep the decentralized register.

Public blockchains are fully decentralized. Anyone can participate in the network. They are suitable for applications that value the benefits of an open system. Ethereum is an example of an open-source blockchain. It combines the advantages of the public blockchain with "programmable action chains" so-called smart contracts.

Private blockchains are different. They are accessible to selected participants exclusively and managed by network administrators. Only participants in the chain can see transaction information. The network administrator assigns privileges to participants. The network operator, or a selected group of participants, performs validations. Formally speaking, a private blockchain is not decentralized. It is essentially a cryptographically secured distributed ledger.

Principally, both public and private blockchains can be used in logistics, and the type can be chosen depending on its purpose and the number of participants in the logistics chain.

This article analyzes the possibilities and justification of applying blockchain technology in logistics, especially last-mile delivery. The paper has five chapters.

Chapter 2 describes used materials and methods.

Chapter 3 presents a summarized literature review and an analysis of collected information. That chapter has two subsections. The first one gives some examples of blockchain technology applications and its application in logistics. The following subchapter discusses the relationships between blockchain and city logistics, particularly last-mile delivery.

In Chapter 4, Conclusions, the authors discuss and summarize obtained results. Based on the analysis and their pieces of knowledge, the authors give several recommendations for last-mile delivery improvement.

The last chapter, Works Cited, presents a list of literature sources used in the writing of this paper.

2 MATERIALS AND METHODS

The study is based on the system-functional approach. The researchers used commonly utilized scientific methods and techniques, including deduction, induction, comparison, scientific abstraction, generalization, and methodological development tools like graphical interpretations. The authors used high-quality literature to support their theoretical positions and argumentation of conclusions. They ensured proper and complete citation of all utilized sources, promoting high reproducibility of the research findings. The used sources encompass publicly available literature referenced in the Works Cited section and the authors' previous research published in scientific papers and presented at conferences.

Before the research, a research question arose: Is there any correlation between logistics service quality and blockchain technologies, and if yes, can blockchain improve last-mile delivery?

For the research question resolving the null hypothesis can be set up as:

H₀: There is no correlation between blockchain and the quality of logistics, so blockchain technology is not suitable for last-mile delivery and logistics processes improving at all.

Because of the research question and null hypothesis, two alternative hypotheses can be set:

H_{a,1}: There is a correlation between logistic quality improvement and blockchain technologies application.

H_{a,2}: There is a correlation between the last-mile delivery quality and blockchain technologies application.

3 LITERATURE REVIEW AND ANALYSIS

Logistics is an indispensable component of every business process. Given that international trade accounts for approximately 90% of total trade (Ziggurat, 2019) and absolute values grow every year, increasing the efficiency of logistics processes has a significant impact on the world

economy. We should know that efficiency significantly depends on the various barriers removal and the organization's improvement.

Here, we will pay attention to blockchain applications in logistics, particularly city logistics, and last-mile delivery.

3.1 Potentials of blockchain technology use in logistics

The classic organization of logistics processes has its advantages, primarily in that the entire organization is centralized on one server and runs by one company. At the same time, it is also a significant disadvantage because that company suffers a great burden and carries a great responsibility in every respect. In case of any error of employees or the company servers' failures, problems arise in the entire logistics chain. The larger the company is, the heavier the challenges are.

Blockchain technology appears as an alternative that can help in logistics process optimization. In supply chains, blockchains enable product tracking during production and through whole delivery to the customer. That can help a lot in preventing fraud, especially Internet fraud. The origin of each product is known, and it cannot happen that the product appears from nowhere. By tracking the shipment movement, recipients can prepare for their receipt timely.

Blockchain has the potential to prevent errors from appearing in supporting documentation. Over 10% of freight invoices contain inaccurate data (Ziggurat, 2019). That affects the effectiveness of the process.

One of the potentials of blockchain technology is the ability to monitor the quality of goods. Since the origin of each product is known, in case of detection of any imperfection, it is possible to remove only the imperfect product from the store shelves. That is especially important in the case of food products.

Blockchain also allows the returned product to be tracked to the seller or recycling center, depending on whether it is a defective shipment or an old, already used but expired product. Until recently, only a dedicated industry practiced it, but now it is available to everyone.

Till now, many companies, startups, and researchers have dealt with this topic and shown interest in applying blockchain technology for last-mile delivery solutions. Some of them are:

- **Walmart** – patented and implemented a blockchain-based delivery "Smart package" system. The system uses a blockchain-based tool intended for use in autonomous vehicles and drones to track shipments, environmental conditions, locations, and other details. The application records the key addresses along the chain, including a "seller private-key address, a courier private-key address, and a buyer private-key address." (Partz, 2018) The "Smart Package" is not the first blockchain technology application at Walmart. Previously, in partnership with IBM, it used blockchain to detect and remove food recalls from the sales list.
- **The U.S. Postal Service** – analyzed different possibilities for its services. The analysis found potential postal blockchain applications in financial services, device management, identity services, and supply chain management. Blockchains can be used for identifying shipments and ensuring effective coordination of stakeholders in supply chain management. The Postal Service coordinates the work of many participants and tracks shipments throughout the delivery process. Blockchain use can speed up shipment delivery in domestic postal traffic, but the best results are in international shipment delivery. (RARC-WP-16-011, 2016) Each shipment can be marked so that the blockchain can identify it. Blockchain can then create transactions and share information promptly. The blockchain surveillance system can execute smart contracts for payment and customs clearance.

Currently, tagging every piece of mail with a sensor is still expensive. In the beginning, the company can use the blockchain approach for high-value shipments. Tags can have additional information about the shipment so that the application can facilitate customs clearance and faster delivery. Also, the application can integrate payment processing into the shipping process. If payments are in digital currency, costs are reduced, and online

trading is facilitated. The private sector tested this approach using the Ethereum blockchain. The applicant pays the invoice automatically when a shipment arrives. The great potential of the application is in drop-shipping, work-sharing, and international terminal fee settlement. Also, Citibank and Australia Post were beginning to research and experiment with this technology to provide new and more efficient services. (RARC-WP-16-011, 2016)

- **Carrefour** – implemented blockchain as part of its supply chain transformation. It launched its 'Carrefour 2022', a four-year transformation plan with a massive investment in digitalization with other costs slashing. Using blockchain technology is a crucial step in meeting this aim. Carrefour was the first in Europe to provide consumers with complete transparency in the traceability of their products. (Mouncer, 2020)

The first step was the "Carrefour Bio" application for the own-brand organic products program, whose use started in April 2022. Carrefour thus became the first company that used blockchain technology in commerce and provided evidence of the actual quality of organic products. Consumers got transparent access to up-to-date information about the products' histories - from their production to their shipping to stores. Blockchain technology Carrefour first applied to a dessert orange of Spanish origin.

Consumers can access product information by scanning the product's QR code. Product life cycle data that the customer can see are (n.d., 2022):

- The product's origin, the route it took, the producer's name, the geographic location, the place of packing, and the means of transport.
- Product quality: harvest date, analysis results, variety, and seasonality.
- Organic certificate: date of conversion, official certificate, and additional initiatives carried out by the producer.

There are a lot of platforms based on blockchains and used in supply chains and logistics. Daley and Urvin (Daley & Urvin, 2023) briefly discussed several solutions (Daley & Urvin, 2023).

In logistics, it turned out that the concept of the transaction as it was in the original blockchain idea is often not enough. Often, business operations depend on many interactions. Therefore, the blockchain must be supplemented with smart contracts, programs that blockchain users can instantiate and use. Ethereum Virtual Machine (EVM) can translate contracts into bytecode language and execute them on all network nodes. That makes it possible to ensure the integrity of the database permanently. The execution of smart contracts is integrated with the ETH cryptocurrency that underlies the Ethereum blockchain. The Ethereum Solidity programming language enables myriad complex distributed applications (Dapps). (Kretzschmar & Eckardt, 2019)

Blockchain can serve both vertical and horizontal coordination. In the first case, a chain is formed from the producer to the end user. In the second, participants of the same level are linked, e.g., the carriers' fleets that carry out the logistics operations.

We believe that consortium or private blockchains are a good solution for logistics chains, especially in cooperation with the IoT. We expect a modern supply chain to provide end-to-end visibility, flexibility, trust, and process control. With its transparency, the Internet of Things brought revolutionary changes to supply chains. At the same time, it provides operational efficiency and the possibility of income. (Čekerevac & Bogavac, 2022)

The cited examples of successful application of blockchain technology in logistics proven savings show that the application of blockchain technology can contribute to improving the quality of logistics services.

3.2 Blockchain technology in last-mile deliveries

By reviewing the literature, one can determine that many works deal with the application of blockchain in last-mile delivery, but, unfortunately, most are only related to this topic by title. That could mean that, in principle, there is not much difference between what is related to logistics and what is

related to last-mile delivery. But there are differences. Last-mile delivery has its specificities due to the specific task it performs and the conditions under which it is performed. Due to the influence on the total cost of transportation, it is highly significant how it is organized, how much it costs, and above all, how satisfied the customer will be with the delivery.

To simplify and speed up the whole process, it is advantageous if there are fewer participants. For these purposes, Kretzschmar and Eckardt (Kretzschmar & Eckardt, 2019) proposed peer-to-peer (P2P) networks and blockchains because there is no need for a proprietary central operator, and there will be no bottlenecks. The cryptographic ability with signature procedures can ensure that only authorized parties can access data, although the blockchain is accessible publicly.

What sets last-mile delivery apart from the rest of the logistics chain are the criteria it must meet. These are primarily the number of participants, accuracy, and sustainability.

For the client's satisfaction, the most important thing is to fulfill the condition that he receives the goods on time and in the correct state. He is (most often) not very interested in the part of the logistics chain that precedes sending his order to his address¹. It is interesting for the buyer to follow the goods from the seller to his address. Therefore, in the case of last-mile delivery, the blockchain can work simplified to focus only on the immediate participants in the last stage of delivery, on the micro-hub, and on the carrier in the last stage. For the previous part of the goods' journey, it is enough for the customer to receive only rough information. That way, the blockchain can be private, shorter, and require fewer resources.

Last-mile delivery needs to be sustainable. That is emphasized in smart cities especially. It is significant to what extent it will impact the environment, how big the source of pollution will be, and how it will affect the already overloaded city traffic. An optimized choice of means of delivery can influence last-mile delivery's sustainability. The optimized selection here primarily means the vehicle selection from the

¹ The exception can be, e.g., organic food, although what constitutes organic food is debatable.

group of unengaged vehicles to deliver parcels. When optimizing the choice of means of transport, the transporter must consider many factors, and the aggravating circumstance is that these factors change over time. For example, in previous years, states stimulated the use of electric-powered vehicles, provided subsidies for their purchase, and emphasized that electric drive is the solution for the future and ensures zero emissions. Recent events in the energy markets have changed that drastically. Now a large part of electricity is obtained by burning coal, which is the most unfavorable and significantly more harmful than gaseous and liquid fuels.

Blockchains and good horizontal coordination can be very successful here if a successful selection model based on criteria relevant to smart cities is established. IoT and smart city technologies can help to automate processes and reduce the involvement of human work. The possibilities are great, and it's just a matter of the system designer's imagination and success in choosing the selection criteria.

Last-mile delivery encompasses the most efficient route selection, vehicle and human resource management, delay management, and troubleshooting. The most common parameters for the last-mile delivery efficiency evaluation are total cost, delivery time, accuracy, reliability, environmental impact, flexibility, traceability, and customer satisfaction (Francescangeli, 2023). When one creates a model for last-mile delivery, data from several areas should be collected and processed.

The first group consists of data related to micro-hub capacities and carrier capacities. Micro-hub data includes:

- The position and size of the micro-hub.
- The size of the territory for which the micro-hub is planned.
- Access road capacities.
- Means of internal transport by types and capacities.
- Human resources micro-hub.
- Data on available funds of micro-hub.
- Data on carrier capacities include:
 - Number and type of delivery vehicles.
 - The capacity of each delivery vehicle.
 - Up-to-date data on the readiness of delivery vehicles.

- Data on planned asset maintenance.
- The carrier's human resources are always up to date on qualifications and availability.
- Always up-to-date data on roads, including city streets.
- Data on fuel consumption and
- Refueling organization.

The second group of data consists of data for the achieved results assessment. They should show how successful the business is and where the weak points are. This group includes data on:

- How many shipments were delivered on time, how many were late, and how many were not delivered and why?
- Proof of delivery.
- How long the vehicle was active and with what load it was loaded?
- How long did the vehicle wait within the delivery parked near the delivery point?
- How long was the vehicle unused?
- How much fuel did the vehicle use?
- The other costs associated with the vehicle and drivers.

The third group of data refers to transactions that may be different. When implementing smart contracts, it is necessary to include the goal of implementation, consideration of system sustainability, token mechanism, and consensus mechanism. That is necessary for the traceability, efficiency, and security of the process when there are several participants. Because of transactions, the model should also contain the following (Lobo, Wicaksono, & Valilai, 2022):

- Token System
- Collaterals (payment for service + delivery assurance)
- Rewards (efficient planning, saved energy, on-time delivery)
- Fines (Tardy delivery, inefficient planning)

Blockchains are already in use in last-mile delivery and will increasingly impact it. They can increase traceability and transparency – giving carriers greater visibility in the last mile and across the entire supply chain. The reasons are (Fidelitone, 2022):

- Blockchain prevents any disputed transaction or unwanted transaction manipulation from taking place in the supply chain.

- Blockchain increases security and prevents hacking. It is especially true when there are many links in the chain.
- Blockchain increases efficiency, as it can reduce manual processes.

Blockchain will show its strength in synergy with automated delivery systems and self-driving vehicles. It will improve the user experience. Drones² have been developing for the past ten years. They came into the public spotlight, especially in 2022 with the beginning of the Russian special operation in Ukraine. It is not expected that drones will deliver commercial packages across the city anytime soon, but logistics leaders have made significant progress. Experimenting with ground-based unmanned vehicles in urban environments showed higher potential than with unmanned aerial vehicles (UAVs) due to fewer regulations that need to be met. One of the main questions remains, who is to blame in a car accident involving a drone? In the future, these types of innovative technologies will be front and center in the supply chain, and companies will need to evaluate and adopt the right innovations to remain competitive (Montgomery, 2022). Unmanned aerial vehicles can come to the fore in sparsely populated areas due to the lower risk of damage caused by falling UAVs than in cities.

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4 CONCLUSIONS

This study looks at the effects of using blockchain in supply chains, focused on last-mile deliveries. In principle, blockchain provides positive effects and enables many benefits for stakeholders in terms of more efficient and effective management of operations while increasing the satisfaction of users of logistics services.

The results of the analysis from subchapter 3.1 reject the null hypothesis H_0 that "Blockchain technology cannot be used in logistics processes improving" and confirm the alternative hypothesis $H_{a,1}$, according to which there are cases where "there is a correlation between the city-logistic quality and blockchain technologies".

The results from subchapter 3.2 also reject the null hypothesis H_0 and confirm the alternative hypothesis $H_{a,2}$: There is a correlation between the last-mile delivery quality and blockchain technologies.

Finally, we cannot avoid pointing out that the bigger the city, the bigger the problems of living in it. It would be much more favorable if countries developed evenly, and the population might progress in their territory and not feel the need to seek happiness in big cities. If the current pace continues, a huge part of the territory will be uninhabited, and the population will be concentrated in bulky and dysfunctional cities.

² A drone is another name for all unmanned aerial vehicles, an aircraft that operates without a human pilot

on board (Robarts, 2019), although the term drone can refer to anything from remote-controlled toy cars to military weapons.

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RAIL PASSENGER TRANSPORTATION IN BORDER PROVINCES IN TURKEY

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Abstract

Transportation plays a crucial role in the movement of information, capital, goods, and services between different points, impacting both the environment and human society. It encompasses the economic, fast, and secure movement of people and goods to yield spatial and temporal advantages. The advent of the steam engine led to the introduction and continued utilization of steam locomotives in railway transportation. In Turkey, despite the need to establish economic opportunities, resource allocation between the two main transportation subsystems, namely railways and roads, remains an issue. Railway transportation is a highly efficient mode of mass transportation, capable of transferring large numbers of passengers and cargo with minimal energy consumption and air pollution, making it environmentally friendly. It generates less noise compared to other modes of transportation, relative to the freight and passengers it carries, and requires less land and urban space. However, the efficient utilization of railway resources is contingent upon sufficient demand. Turkey's strategic location as a gateway between Europe and the Middle East underscores the need for further development of rail passenger transportation. This would optimize infrastructure resources, enhance environmental sustainability, and promote economic and social benefits through cross-border mobility. This paper examines the challenges hindering the expansion of passenger railway transport and offers solutions and recommendations for the future.

Keywords: Turkey railway border gates. Railway transportation. Freight transportation. Passenger transportation. Environmental sustainability

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1 INTRODUCTION

The history of transportation dates back to 7000 BC, when mankind began to use domesticated animals, especially horses, for transportation. Humanity had to wait another four thousand years

for the invention of the wheel. By the 1960s, the weight of the highway began to increase, and polishing, material handling, and transportation activities were considered together under the heading of physical distribution.

The world population has exceeded 8 billion. According to United Nations studies, the population is projected to reach 8.6 billion in 2030 and 9.8 billion in 2050 (Alatas & Somunkiran, 2008). While 54% of the population lives in cities, it is estimated that 10 new metropolitan areas with populations exceeding 10 million will emerge in the next two decades and that this proportion will reach 68% by 2050 (Alatas & Somunkiran, 2008). In line with expectations for population and income, transportation demand will increase for all regions of the world.

Attempts for railway transportation in the Ottoman Empire started for the first time in 1851 with the concession of the 211 km Cairo-Iskenderiye railway line. The first railway line within today's borders was constructed between Izmir and Aydin (130 km) in 1856 with the concession granted to the British and opened for operation in 1866. Afterward, many railway projects were initiated under the concession principle including length (km), operation of all kinds of regional resources on the railway line, etc., in the absence of economic rationality, based on a "national" basis in the Ottoman Empire. In 1869, the construction concession was awarded to Baron Hirsch, and the 336 km line sections between Istanbul - Edirne and Kırklareli - Alpullu amounting to 2000 km Eastern Railways within the national borders were completed and open for operation in 1888, connecting Istanbul to the European railways.

In the VIIIth Development Plan of Turkey (2001-2005), the "restructuring of the railway system is planned". The 2023 Vision Document for railways enhances the following:

- Increasing the railway network to 31,000 km.
- The share of railways in freight and passenger transportation should reach 20% and 15%, respectively. The increase of the share of railways in the freight and passenger transportation markets is a priority target stated as a political measure.
- Other supporting measures offer the completion of connections to major logistics centers, thus enabling the increase of the

load-carrying capacity to 50 million tons; through construction of 1,213 km HSR and HT lines will reach 12,915 km and 11,395 km, while conventional railway lines should be increased by 12,115 km, reaching a total railway length of 25,030 km in 2023 (Karaismailoglu, 2022).

2 RAILWAY TRANSPORTATION

"If you want to be rich, build a railway. If a train comes here, then the treasure follows". Government officials or ordinary people always think that "you can get rich as long as you build a railway". (Banerjee, Duflo, & Qian, 2009) According to those beliefs, the development of the traffic network can significantly increase the per capita GDP growth rate, which has a great positive impact. The railway is a nationally important infrastructure, it's comprehensive transportation, it's one of the daily and popular means of transportation, it's essential for the people who frequently travel somewhere in daily life, and it's the important carrier of the national economy operations. It plays an irreplaceable role in promoting the sound and fast development of the economy and society of Turkey. According to Benjamin Faber (2014) (Faber, 2014), the impact of connecting the national system network is relatively high on the GDP growth, industrial added value, government revenue, and non-agricultural added value, so the county-level cities connected to the national system network have an obvious positive impact, unlike the other without access to the national system network. The study results show that high-speed railway construction can improve transportation conditions and the convenience of inter-city contacts. However, everything has advantages and disadvantages.

According to the risk calculations made at a scale of 1 billion/km, railway transportation is 243 times safer than highways in terms of fatal accidents and 500 times safer in terms of injured accidents. It is also considerably lower than highway transportation costs (Cekerol, 2007). Railway transportation is preferred for both long and short-distance passenger transportation, low energy consumption due to low friction, and comfortable and fast travel (Kurt, 2010).

2.1 Railway Border Gates in Turkey

Customs border gates and ports with railway connection and border stations connecting our country with neighboring countries are the following

- To Syria : Nusaybin, Islahiye, Cobanbey
- To Greece : Uzunkopru
- To Bulgaria : Kapikule
- To Iran : Kapikoy
- To Armenia: It can be listed as Eastern Gate.

Dogukapi border gate is closed due to the problems with Armenia, while Nusaybin, Islahiye, and Cobanbey border gates are closed due to the civil war in Syria. There are also railroad connections to 11 ports (Haydarpaşa, Derince, İzmir, Bandırma, Mersin, Samsun, İskenderun, Tekirdağ, Zonguldak, Yilport and Evyap).



Figure 1 Railway Gates of Turkey

Source: (Uysal, Türkiye'nin demiryolu sınır geçişleri: Hangileri açık?, 2015)

Turkey shares its borders with a total of 8 countries, 6 in the east and south and 2 in the northwest. Turkey borders Georgia (276 km) to the northeast, Armenia (316 km), Nakhchivan Autonomous Republic (18 km) and Iran (454 km) to the east, Iraq (331 km) to the southeast, Syria (877 km) to the south, Greece (212 km) and Bulgaria (269 km) to the northwest.

Table 1 Turkey's Railway Border Gates

	City	Name	Country Border	Ministers Board Opening Date
1	Edirne	Uzunkopru	Yunanistan (Pityon)	04.09.1953
2	Edirne	Kapikule	Bulgaristan (Svilingrad)	01.04.1988
3	Gaziantep	Islahiye	Suriye (Ekbez)	04.09.1953
4	Kilis	Cobanbey	Suriye (Akderun)	04.09.1953
5	Kars	Akyaka	Ermenistan (Aktif Degil)	04.09.1953
6	Mardin	Nusaybin	Suriye (Kamislı)	04.09.1953
7	Van	Kapikoy	Iran (Razi)	07.10.1971

Source: (Uysal, 2017)

Due to its geographical characteristics, Turkey has border gates that allow for all types of transportation systems. The majority of these are sea, air, and road border gates, with a limited number of railway border gates. According to data from the Border Management Bureau of the Ministry of Interior, Turkey has 138 border crossings, 102 of which are permanent and 36 temporary. Of these border gates, 57 are sea-, 50 are air-, 25 are land-, and 7 are railroad-border gates. On Turkey's land borders with 8 countries, there are railroad connections with 5 countries, except for the Akyaka (Armenia) railway border gate, which is now closed, crossings are provided at 6 railway border gates, 3 of which are on the Syrian border and one each with Greece, Bulgaria and Iran (Bakirci M. , 2013).

2.2 Railway Assets

Today, the increasing world population and global crises due to pandemics and climate change have led to the search for alternative energy sources in the logistics sector. In this context, there is a tendency towards integrated solutions and transportation modes allowing door-to-door transportation to reduce greenhouse gas emissions going to the environment as a result of the transportation process.

Although rail freight transportation is not the leading mode of transportation worldwide, increasing the use of railways due to both cost and environmentalist approaches is among the priorities of governments and the private sector (Tumenbatur, 2021).

Table 2 Passenger Transportation by Railways (in Thousands)

Passenger number	2017	2018	2019	2020	2021
	182.790	185.010	246 013	148.314	191.600
Suburban	160.544	160.721	219 999	141.868	181.580
The main line	22.246	4.289	26 014	6.446	5.650
HST	7.163	8.104	8 274	2.833	4.370
Passenger km	8.465.000	8.938.000	14 259 106	8.297.000	10.665.456
Suburban	4.782.000	4.564.000	9 347 106	6.819.000	8.414.915
The main line	3.683.000	4.374.000	4 912 000	1.478.000	723.497
HST	2.218.000	2.551.000	2 678 000	941.000	1.527.044

Source: (T.R. Ministry of Culture and Tourism, 2023)

While the railway infrastructure in Turkey has developed more in freight transportation, it has not been the same with passenger transportation and the number of passengers decreased due to the Covid-19 outbreak in 2020, not being able to catch up with the numbers in 2019.

The total number of visitors to Turkey slowed down due to Covid-19. The increase continued in the following years. In 2017, the number of passengers arriving by train was 0.03% of the total, while this ratio remained unchanged at 0.036% in 2022.

Table 3 Total Number of Visitors to Turkey

Year	Number of people	Travelling by train
2018	39.488.401	15.464
2019	45.058.286	29.291
2020	13.092.545	4.785
2021	24.12.266	1.587
2022	51.387.513	18.738

Source: (T.R. Ministry of Culture and Tourism, 2023)

Table 4 Distribution of Foreign Visitors to Turkey by Provinces to which Border Gates

Border gate	2022		2021		2020		2019		2018	
	train	total	train	total	train	total	train	total	train	total
EDIRNE	17.185	4.636.437	1.324	2.599.609	3.005	1.804.051	19.612	4.348.565	13.318	3.835.131
KAPIKOY	133	436.387	114	54.126	1.530	19.652	9.673	328.326	2.275	23.2202
KILIS										
COBANBEY	1.420	64.725	149	89.413	0	14.964	3	137.987	1	136.638
TOTAL	18.738	5.137.549	1.587	2.743.148	4.535	1.838.667	29.288	4.814.878	15.594	4.203.971

Source: (T.R. Ministry of Culture and Tourism, 2023)

Edirne Kapikule Customs Gate serves both road and rail transportation. The number of foreign visitors to Turkey entering through Edirne Kapikule Station Customs Directorate was 0.34%

in 2018 and 0.37% in 2022. It is higher than the other two train customs gates. In 2022, 0.36% entered by train.

Table 5 Distribution of Foreign Visitors leaving Edirne by Train

Foreign visitors	2018		2019		2020		2021	
	train	total	train	total	train	total	train	total
	12.336	3.75.2166	16.921	4.290.478	3.225	1.830.550	2.283	2.518.268

Source : (T.R. Ministry of Culture and Tourism, 2023)

If we look at the rate of departures of foreign visitors from Turkey in their vehicles, it was 0.32% in 2018, and in 2022 it increased to 0.38%.

With an area of 785,347 km², Turkey has a total border length of 11,236 km. In this respect, Turkey is among the countries that can be considered

large in terms of both area extent and border lengths. While the majority of the total border length is maritime borders (75%), 25% is land borders with different countries.

When evaluated in terms of maritime borders, it is seen that Turkey has coasts with 4 different seas,

the maximum coastal length is with the Aegean Sea (38%), while the shortest maritime border is located in the Marmara Sea (17%) (Bakirci & Aydogdu, 2019)

3 CONCLUSIONS

The transportation of large loads on railways was first carried out in 1738 in a mine in Cumberland, England. The Industrial Revolution, which started with the emergence of steam engines, led to great developments in railways and railways have become the most reliable, economical, innovative, and environmentally friendly transportation system in human and freight transportation, which continues to this day.

The development of railways in Turkey started with the nationalization of 4,559 kilometers of railway, which was inherited from the Ottoman Empire and concessioned by foreign companies, after the War of Independence.

In 1932, in the First Five-Year Industrial Plan and especially in the Second Five-Year Industrialization Plan prepared in 1936, Turkey followed a conscious railway policy to solve the problem of passenger transportation and to

transport the bulky and dense loads of basic industrial inputs such as iron and steel, coal and machinery with the cheapest cost by railways.

Policymakers should also take into account the feeder role of railroads for sectoral structures such as agriculture, industry, and tourism, which are subject to warm relations between urban and rural areas. Moreover, the methodology used in this study aims to provide more empirical support for policymakers on rail transportation and infrastructure. One of the most important aspects of this support is that it allows for dynamic monitoring of the period under analysis as a process.

When evaluated based on carbon emissions, railway transportation infrastructure should be preferred within the scope of green logistics, if possible, and necessary infrastructure works should be carried out.

The share of railways in the total number of visitors entering and leaving Turkey by train is very low. Due to infrastructure works and insufficient demand, train services opened from time to time at customs gates have been canceled.

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TEACHER'S AND PUPIL'S IDENTITIES IN THE PROCESS OF WRITING

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Abstract

This paper explores the identity notion in the context of the teacher-pupil relationship and its impact on professional development. The study draws on international comparative research focusing on Bulgarian teachers and an example of one lesson in the mother tongue (Bulgarian language). The concept of professional identity is examined, encompassing various components such as the profession's philosophy, skills, attitude toward work, and interactions with colleagues. It is argued that professional identity is tied to social dedication and cultural values closely. The relationship between teachers and pupils involves coordination, cooperation, and co-construction which are essential for creating an orderly learning environment. The teacher's identity, social interactions, and significant memories influence the pupil's identity formation. The connection between the body and identity is also explored, highlighting the nature of subjectivity and its cultural influences. The research emphasizes the need for a qualitative approach to understand how the body shapes the identities of both teachers and pupils and how environmental factors contribute to this process. Overall, this study contributes to our understanding of the complex nature of professional identity in the teaching profession.

Keywords: teacher, pupil, identity, literature, mother tongue, teaching, education

1 INTRODUCTION

There are two subjects in the learning process – the teacher and the pupil. The interplay between them creates objective reality. Both sides are active to varying degrees. Their actions cover two directions of impact – from one to the other partner and, simultaneously, from outside to the inside of the person. Parallel existing realities influence the formation of identity. Concerning both, teacher and pupil, the course of the training depends

largely on the roles they perform. That is why it will be further related to the professional identity of both, teachers and pupils.

2 PRELIMINARY THEORETICAL REFLECTIONS

A publication, which is part of an international comparative study, provides data on the professional identity of teachers in Bulgaria. It states that it is "appearing in the professional space when one realizes him/herself as a professional" (Berberyana, Bogdanova, Silchenkova, Ermolaeva, & Vardanyan, 2019, p. 308). A broad understanding of the nature of

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professional identity is perceived in the same publication. It includes the philosophy of the profession, professional knowledge, skills, professional attitude to work, interaction with colleagues, and conduct of professional representation. Based on these components, professional identity is associated with the social dedication of the teacher to the profession, which is a projection of the competencies, cultural and value orientations of the pupils (Berberyan, Bogdanova, Silchenkova, Ermolaeva, & Vardanyan, 2019, p. 313). The specified components describe the professional identity as a complex category.

This examines the relationship between pupils and teachers as "Prozessen der Koordination, Kooperation und Ko-Konstruktion" (Thies, 2014, p. 194), which is a prerequisite for creating the necessary order and regulating communication between them. In the course of this relationship, pupils not only assimilate knowledge of the subject but also curricular skills. The authors include the skills of communication, cooperation, discussions about subjects of key topics, a conflict resolution. In this context, the interaction between the teacher and the pupils is a set of social practices that have a broader anthropological meaning and encompass the person as a whole.

In a general theoretical plan, Eberstadt & Kuznetsov (2008, p. 18) examine the identity as being composed of two components: a subjective sphere of identity in which "I" comes to the fore. The second component is the empirical sphere. The action interacts with the surrounding environment and after that, the performance takes place through the internal processing of this interconnection in the form of recall and experience. In this, only those memories that are important are left in the mind of the individual. It is they who have the strongest influence on the formation of identity. In this sense, identity formation is closely linked to social interaction between the teacher and the pupils. Further, it is a set of social practices that have a broader anthropological meaning and encompass the person as a whole.

Another important aspect to clarify identity is its connection with the body. For the first time, this idea was seen by Erik Erickson in the late 60's. Adolescence is a particularly important period for

the formation of identity: "Erikson (1968) described identity development as the gradual integration of different self-images" (Kling, Waengqvist, & Frisen, 2018, p. 102). Moreover, Ericson emphasizes that this process takes place in the interaction with the social environment. For the description of this connection, Piran (2016, p. 44) uses the "embodiment" construct: "... embodiment denotes specific assumptions regarding body and mind, as well as body and culture ". He supports the idea of Merleau Ponty about the inability mind to be separated from the body. According to Ponty, the body participates in the exploration of the world and becomes a bearer of subjectivity. Thanks to this peculiarity the body "absorbs" various cultural practices and turns the external social experience into its internal possession. For Zirfas & Jörissen (Zirfas & Joerissen, 2007, p. 102) in everyday life, there is a specific "policy" for identifying the body. The most accessible example according to them is the perception of people as men and women. Sharing the views of M. Douglas they give special importance to the ideas about the body as something social and physical. At the same time, in our notions of differences in the body of a man and a woman, there is always something that prevails and is more related to the social which is to some extent imaginary, as Zirfas & Joerissen (2007) claim: "the individual physical body forms the symbolic place of the social".

The theoretical ideas presented so far about the nature of the relationship between teacher and pupil, as well as the importance of the relationship between body and identity, presuppose the implementation of this qualitative research. It is an attempt to describe in general two phenomena:

- how the body forms the identity of both the teacher and the pupil and
- how the material in the environment influences their identity.

Further, we will discuss some more concrete ideas about the professional identity of teachers and the identity of students.

3 THE PROFESSIONAL IDENTITY OF THE TEACHER

The professional identity of the teacher can be interpreted from a theoretical and methodological point of view (Rodrigues & Mogarro, 2019, p. 1).

In essence, the concept of identity serves as a framework to examine various aspects of a teacher's professional role, such as analyzing lesson planning, delivery, and assessment, as well as resolving conflicting perspectives when executing learning tasks. That enables teachers to develop a personal perception of themselves and gain insights into their professional realization. Concurrently, such information can be utilized methodologically to enhance teacher training programs. We discovered that there was often a tendency to avoid providing a precise definition for the 'professional identity,' with frequent reliance on quotations from other authors instead. To this end, key theoretical concepts such as reflection, self, emotions, initial teacher education, learning, professional knowledge, and perceptions of teaching are often used. Other authors prefer terms such as agency, collaboration, professional development, professional image, professionalization, and the relation between theory and practice (Rodrigues & Mogarro, 2019, p. 3). Due to the existing difficulties, it is necessary to choose an identity concept that is consistent with the purpose of this study. Such is the understanding of Fomunyan (2016, p. 187), who defines it as a fluid construct that is subject to continuous change. The factor influencing it is the curriculum used by the teacher at a specific time and place. According to Fomunyan, there are many different beliefs about the nature of identity. The first one examines the relationship between identity and the Self and the role of emotions and reflection. Also significant are the discourse of understanding about themselves and the actions that follow the reflection. Contextual factors have a considerable influence on the formation of identity. Other authors consider the professional identity as interpreting and reinterpreting the experience. That suggests that the process is continuous and lasts throughout life because the teacher monitors and realizes the professional development according to the results achieved in the training. It is possible to manifest different identities during the different stages of development that the teacher has to harmonize.

In essence, Fomunyan defines the teacher's professional identity as "central to a teacher's belief system that guides his or her actions and practices, inside and outside the school environment" (2016, p. 187). Because of its

social nature, identity changes according to time, place, circumstances, and space. Therefore, its formation is "open" and also depends to a large extent on the perceptions of pupils in the classroom learning process.

4 THE IDENTITY OF THE PUPIL

The pupil's identity is determined by its role in the learning process. How it perceives and evaluates the impact of the teacher affects the perspective on its characteristics as a learning subject. The pupils' judgments about themselves are also related to the classmates' opinions about their results in the learning process. Brown (2021) emphasizes the influence of emotions and motivation in shaping the perception of oneself as a pupil. So, they are influenced by the teacher's beliefs associated with the "perfect student." This notion was embedded in pedagogical research at the beginning of the 50s years of the XX. century as typical characteristics of pupils originating from the working class. Later, at the beginning of the 90s, Waterhouse pointed out that the teachers' perceptions were related to the pupil as a "norm" who captures all behavioral characteristics, which correspond to the "average" achievements in a particular class.

The research proves that, as a learning subject, pupils form their identities according to their level of achievement. High achievement leads to an overall positive assessment. Low achievement makes students think that they will never reach the 'average' for the class. The teaching style reflects in a complex way the student's identity. It can give rise to opposing experiences: confidence or anxiety. In any case, however, according to Brown (2021), the hierarchy of achievement affects the pupils' identity as a learner and has a stronger influence than the teaching style. In this sense, the individual-personal beliefs of the pupil about her/his positioning among the classmates and the teacher's ideas about her/him lead to the construction of the identity.

5 THE ANTHROPOLOGICAL CHARACTERISTIC OF WRITING

As a form of learning experience, writing is a specific form of activity. Thanks to it, the real objects in space are transformed into abstract signs that need decoding. This model of

"translation" from sign to meaning is called "WRITING" by Dell Hymns. Through this acronym, the author describes the essence of writing:

- W: Writers – Who are the writers? Do they have a specific status? Are writing skills subjected to institutionally recognized patterns?
- R: Readers – Who are the readers? Is the role of the reader independent of that of the writer? Are there different reading skills according to sociocultural or status levels?
- I: Instrumentalities – What kinds of instruments does a writer use to write the messages, and how are they related to the keys through which a reader, the events described, must - or should - interpret?
- T: Textualization – What rules govern the passage from cultural- and linguistic content in the written texts? Is there any distinctive pattern of "translation" between linguistic and scriptural domains?
- I: Interpretative context – What is the role played by the environmental context in which the written text is placed in interpreting that text?
- N: Norms – Are there graphic and social norms related to the writing and reading of different kinds of texts?
- G: Genres – Is there a "canon", either implicit or explicit, through which texts are classified and hence interpreted? (Perri, 1999, p. 276)

This detailed description of the writing offers a way to interpret the materials collected for the study. Writing is a complex activity through which pupils master their cultural and social norms of behavior and understanding of the surrounding world. Writing offers specific tools for mastering knowledge and expanding the content of everyday communication.

6 RESEARCH DESIGN AND METHODOLOGY

Fomunyan cites the definition of Opie for the essence of the methodology. It essentially describes the methods or approaches by which the investigator's critical data (Fomunyan, 2016, p. 188) is reached. This study is a qualitative case study. It aims to describe the mechanisms of writing in class in literature and seeks an answer to the research question: *How does the teacher's professional identity influence the pupil's identity*

as a learner in the writing process? This question will help establish the specific forms of interaction between the teacher's and the pupil's identities. The participants in this study were one teacher and one class of pupils from the compulsory secondary school of education. The school is located in the central part of a medium-sized town in southern Bulgaria. A series of photographs we used to collect data on learning in one literature class. In addition, the subject of analysis will be the curriculum and the literature textbook.

7 FINDINGS AND DISCUSSION

The object of the survey is one lesson in Bulgarian language in the 9th grade of secondary school (MNP, 1989). The lesson topic is writing an essay on a humanitarian issue in a literary text. The survey covered documents corresponding to the timing of the monitoring. The same topic was acquired one year earlier, in the 2019/20 school year.

Syllabus

Fomunyan uses the following syllabus definition: "A detailed outline of what students must learn in the course of studying a particular program or course" (Smith at. al. cited by Fomunyan, 2016, p. 189). The Bulgarian syllabus describes the following components: the leading type of learning activity, the standards it needs to meet, the topics to be studied, basic new concepts, types of learning assignments, and possible curricular links.

The standards for mastering the writing relate to:

- appropriate use of different language registers;
- peculiarities of different types of texts: media, scientific, civil, institutional, and literary.

The topics foreseen for mastering the writing are as follows:

- the text and the socio-cultural context: what defines the situation of communication; the functions of the text in communication;
- the text in public communication: features of public communication; spheres of public communication – media, scientific, civic, artistic, institutional.

The learning tasks are related to the creation of different texts depending on the purpose of the communicative act and the sphere of

communication. The content presented reveals the objectives and tasks of writing as a learning activity. It helps both, to absorb new knowledge and to rethink the already familiar. Functional knowledge forms the identity of the teacher and the pupil by stimulating cognitive and linguistic processes. Thanks to them, the subjects of teaching and learning can answer the question "Who am I?" in the course of learning communication. Information processing presupposes dynamics in communication and the perception of different perspectives, which positively influences the development of the individual.

Content

The educational content on the topic of writing an essay on a humanitarian issue in literary work is presented in the textbook according to two basic didactic perspectives: those of academic rationalism and the technological approach (Bowen, 1994, pp. 451-452). The content highlights basic scientific concepts such as analyzing the title, composition of the text, theme, and thesis of the essay, selection of arguments, language, and style. Linguistic competence is needed to understand the basic concepts. In the textbook, there is also an example of an essay that pupils should consider and use as a model for writing their essays. This component of the educational content is consistent with the technological approach, which focuses on the mastering of skills in the learning process. The essay pattern forms the student's idea of the final result he must reach. Imitation is the underlying mechanism embedded in this type of content. In this sense, it determines the physical and cognitive activity of the pupil.

Lesson's Analysis

The photographs attached to the text can trace the writing process in Bulgarian language lessons.

The first photograph presents the teacher as a "speaker" and the pupils listening and writing. In the second photograph, the teacher and students write simultaneously. In them, the performative character of the speaking and writing of the teacher in the class is manifested. The perception of these activities by the pupils causes the corresponding forms of movement in them. There is a "mimetic circulating" (Burghardt & Zirfas, 2019, p. 116) of behavior and processing of information. The communication messages sent by the teacher mirror the actions of the students. But the first photograph reflects anything more than just a simple reproduction of the "pattern" action. The teacher speaks and the students "expand" listening by writing. Thus the "added" meaning of the messages addressed to the pupils arises.



Photo 2



Photo 1



Photo 3

In the second photograph, the hand movements of the teacher and the pupils are synchronized.

When considering photography 3, we can see the educational character of the teacher's writing. Writing on the board sets only the general structure to which pupils add what the teacher speaks. The understanding of the course information proceeds and the fixation of the most important of it is achieved by pupils through writing.

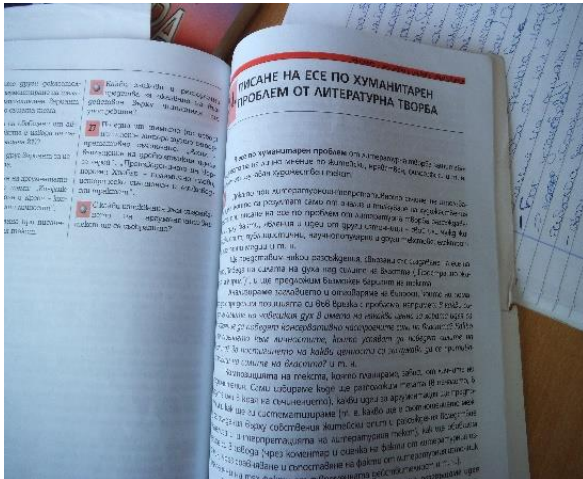


Photo 4

The fourth photograph reflects the similarities in organizing the written text in their class notebooks and the textbook. The text in the textbook and the notebook are a "block" of related information. The concepts are arranged one after another, accompanied by the necessary explanations. The presentation of the content in the textbook has a disciplined character and defines the strategy of writing. Thus, the text in the textbook controls indirectly the movements of the hand and the thought in the writing process.

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The analysis makes the logic of writing in class visible. As a practice, it has mimetic, discursive, and habitual components (Burghardt & Zifras, 2019, p. 118). The teacher shows what she/he is capable of by her/his biographical experience and level of awareness. Accordingly, the pupils imitate the teacher's actions again depending on their world. Differences in knowledge predetermine the discourse within which they interpret the perceived information. The behavior they demonstrate reveals the habit of looking at writing.

8 CONCLUSION

The analysis convinces us that the teacher's professional- and the pupil's identity in the "learning" role have a close relationship. The teacher affects not only thought processes but also the pupil's body. The planned learning content determines the type of activities of the pupils and teacher. The subject of the teaching consciously influences through the actions and provokes "mirror" reactions in the recipient. However, the pupils' reactions "extend" the impact of the messages sent to them. The perception of impact has a two-collar structure:

- At a basic level, the crucial components of the teacher's actions are reproduced.
- At the personal level, components that result from individual focus are added to the initial perceptions.

Thus an individual experience becomes "mobile", enriching and influencing the student's social development. Through this mechanism, the teacher's actions make sense, both for self-evaluation and for the realization of the socially significant function of motivating the development of pupils through the means of teaching.

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Note

The photographs are published with the consent of the teacher and the parents. (Author)

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LOGISTICS CLUSTERS AND THEIR POTENTIAL FOR ECONOMIC DEVELOPMENT

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Abstract

Supply chain resilience in the face of shocks has arisen as a policy issue due to the multilateral trading system lowering trade barriers. Innovations in transportation technology created intelligent transport systems and production fragmentation of global supply chains. However, climate shocks and the COVID-19 pandemic restructured supplies in the global markets. At the same time, geopolitical conflict and tensions emerged with Russia's invasion of Ukraine, increased China's military activity, introduced additional tension, and created difficulties for the supply chains. On the other hand, the current industrial policy, aiming at national economic growth, is motivated by objectives different from increasing company-level productivity or spillovers between sectors. The concern primarily revolves around supply chain resilience, the fear of weaponizing exports, supporting technological advancement, and the need for policymakers to introduce greater control over economic activity in anticipation of potential shocks. In cross-border supply chains, some governments seek to coordinate their industrial policies with the most significant partners without implementing measures at the national level (Bown, 2023). Overlaying other considerations is the existential threat of climate change, a significant driver behind many modern industrial policy initiatives. That is leading to the rebirth of the idea of logistic clusters uniting different partners in size with foreign trade-oriented activities, aiming at efficiency as well as resiliency of the logistics chains. Based mainly on deep secondary research, this paper addresses the rebirth of cluster ideas in international transport and logistic activities.

Keywords: *logistics, clusters, efficiency, supply chain, activities*

1 TRANSPORT AND LOGISTICS ACTIVITIES IN BULGARIA AS A SUPPORTING INDUSTRY

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With transport contributing around 5% to the EU GDP and employing more than 10 million people in Europe, the transport system is critical to European businesses and global supply chains (EC, 2020). The primary challenge lies in reducing the reliance of the transportation system on petrol, all while maintaining efficiency and mobility levels without compromising. In line with the "Resource

Efficiency Europe" initiative set out in the Europe 2020 strategy and the Energy Efficiency Plan, transport must use cleaner energy, sustainably exploit modern infrastructure, and reduce the harmful impact on the environment (water, soils, and ecosystems), as limiting mobility is not a solution. In addition, increased demand for freight transport is expected to lead to growth of more than 40% by 2040 (EP, 2016), though the general opinion is that this forecast is overrated.

Logistics efficiency is therefore vital to both international trade development and growth. A country's trading power depends on agents' access to transport and logistics networks. Better overall logistics performance is strongly associated with trade expansion, import and export diversification, investment attractiveness, and economic growth.

Furthermore, the efficiency of a country's supply chain (in terms of cost, time, reliability, and flexibility) depends on the specific features of its logistics performance, in the co-location of companies sharing assets, competencies, logistics infrastructure, tracking systems, knowledge and information (Chung, 2016). In the opinion of several scientists, the development of the transport and logistics infrastructure is the basis for supporting many industrial activities, and the increase in the number of companies leads to an increased demand for logistics services, through two complementary factors in terms of the value-added process, namely:

1. availability of logistics terminals and industrial zones (national and local competitiveness and ability to attract foreign investments);
2. possibility of concentration of industrial companies that use logistics services.

The state of the transport infrastructure, the availability of ITS, as well as the potential for the development of combined transport in Bulgaria, are shown in the Integrated Transport Strategy in the period 2030 (2017). Due to its intermediate geographic situation in the active transport corridors, along which freight and passenger traffic is attracted to pass through the territory of the country, intermodal terminals have been approved for inclusion in the map of the trans-

European transport network (TEN-T), which can provide several opportunities for increased competitiveness and economic growth of Bulgaria (EP, TEN-T Revision – AUSTRIA, 2022). Transport infrastructure is also of crucial importance for the development of industrial zones planned in the North-Western region (in the cities of Pleven, Cherven Bryag, Dolna Mitropolia, Levski and Nikopol), North Central region (Design and construction of industrial, technological and transport-logistic and fair parks), South Central region (Completed industrial-logistics zone, Svilengrad), South-Eastern region (Project "Building the technical infrastructure of the Industrial and logistics park - Burgas and High-tech park Bulgarovo"), etc. During the period 2014-2020, funding for transport infrastructure tripled, with a primary focus on the main transport network where the EU experiences the most significant added value. To prioritize East-West connections, almost half of the total EU funding for transport infrastructure (€11.3 billion from the Connecting Europe Facility) will go to countries supported under the Cohesion Policy, which also includes Bulgaria.

The investment strategy of the Operation Program "Transport and Transport Infrastructure" (2014-2020) (n.d., 2018)), in the part of intermodal transport and terminals, aimed at developing the network of terminals meeting the requirements for modern freight transport services to ensure better coordination between individual types of transport in the direction of the development of intermodal services, establishing of reliable and fast rail connections between terminals. Operational Program "Transport Connectivity" (OPTC) 2021-2027 (Luica, 2022) will concentrate its investments mainly on the completion of priority railway and road directions and on promoting multimodal transport by improving connections between individual modes of transport. The Integrated Strategy identifies seven terminals, two of which on the design stage (Ruse¹ and Varna), two non-working (Yana and Dragoman), two in operation (Burgas - Dolno Ezerovo and Stara Zagora), and one prepared for concession (city of Plovdiv). State Enterprise National Company Railway Infrastructure (NCRI) owns three

¹ An interesting fact was the initial inclusion of the intermodal terminal in Ruse in the Recovery and Sustainability Plan (RSP), but consequently, it was

dropped due to the impossibility of being completed by 2026 (RuseInfo, 2023)

terminals. NCRI and State Enterprise Port Infrastructure jointly own one. Private logistics companies operate the remaining terminals.

2 LITERATURE REVIEW OF THE NATURE OF LOGISTICS CLUSTERS

The interdisciplinary field of logistics intersects with transportation, technology, public policy, global trade, and other macro issues. Logistics is becoming a major part of the process of achieving competitive advantages in today's global economy. Logistics clusters, which enhance complexes of logistics activities, are concentrated in certain locations, usually associated with the transport infrastructure points (e.g., ports, free duty-free zones) worldwide. The clustering process of this kind unlocks positive influences over economic growth while stimulating related economic diversification in logistics-intensive areas.

The role of the supply chain for our country and the rest of the world related to logistics is not only about increasing value and benefits along the chain but also about reducing the overall logistics costs, energy consumption, and harmful emissions over the environment. Those strengths bring new opportunities, such as driving new capital investments and jobs. Logistics clusters and their capabilities play a significant role in enhancing the competitive positions of both the national and global economies.

The "logistics cluster" is a geographically concentrated complex of logistics-related business activities. Yossi Shefi outlines the characteristic "positive feedback loop" of the development of logistics clusters and what distinguishes them from other industrial clusters; how logistics clusters "add value" by generating other industrial activities; why firms should locate their distribution and value-added activities in logistics clusters; as well as the proper role of government support in the form of investment, regulatory and trade policy (Sheffi, 2012). Logistics clusters, in which sets of logistics activities co-locate and concentrate in specific locations, have emerged worldwide. Such clustering unlocks large positive externalities and economic growth in logistics while stimulating

related economic diversification in logistically intensive fields (Smith, 2014).

Horizontal cooperation affects the interaction between a manufacturing firm and a logistics operator, dealing with inefficiencies (Horvath, 2001). It is carried out by synchronizing the amount of cargo to be transported with the distribution networks ("insyncing"). In terms of warehouses, there is an optimization of the combination of stocks (partnership in the use of warehouse areas), in the case of transport – joint expeditions and joint use of transport capacity. In addition to warehousing and transportation, horizontal cooperation can be expressed through joint efforts to create a critical mass of customers, which increases the frequency of deliveries (especially effective with common delivery points for partner companies). Another effect is the increased intensity of supplies and the ability to negotiate lower vehicle prices.

Logistics-intensive industrial clusters are agglomerations of several types of firms and operations:

1. companies providing logistics services such as 3PL², transportation, warehousing, and forwarding services.
2. logistics operations of industrial firms, such as distribution activities for retailers and manufacturers (in many cases post-sales services).
3. operations of companies with logistics as an integral part of their business.

Similar logistics clusters also include companies performing truck maintenance activities, software providers, specialized law firms, international financial service providers, etc.

The added value of the logistics cluster is achieved because of the intensity of the transport services offered, the sharing of storage areas and equipment, the use of the advantages of free economic zones, for example, the avoidance of certain charges, which on the one hand creates similarities with the classic industrial clusters, and on the other hand, contributes to higher economic efficiency and competitive advantages. Therefore, measuring and analyzing the activity of the logistics cluster is relevant to local, national, and regional competitiveness.

² Third-party logistics



Fig 1 Location of intermodal terminals in Bulgaria
 Source: Revised Trans-European Transport Network (TEN-T) (EC, 2023)

Research in this field is inadequate and is concerned mainly with logistic parks (Amrani, 2007), (Giraldo, 2009), (Dai & Yang, 2013), and (Sako, 2003). The concept of "logistics center" is also encountered in the logistics practice, which to a certain extent covers different features and can be identified with the logistics cluster. Logistics centers (or "logistics parks") coordinate and control warehouse and transport services and information services of various companies, bringing together companies from different industries in one place, and setting new standards in the development concepts, design, and management of logistics activities.

The situation of logistics center should provide convenient access by land transport and, if possible, by water and air, ensuring the effective distribution of goods within the country and the whole region. Apart from the strategic location, some of the other key features of the logistics park include modern areas and facilities, established areas and additional services, office and retail spaces with flexible layouts, temperature-controlled areas, etc. The warehouse areas in the logistics center possess typical distribution and functional characteristics, such as loading docks,

accessibility, which facilitates loading operations, security with controlled access, fire-fighting installations, and other means of safety.

With logistics clusters, there are also opportunities to increase productivity, due to shared resources and the availability of suppliers; developed networks of human potential, including knowledge exchange, know-how, and mutual understanding; high degree of trust among the companies in the cluster; the availability of educational and training institutions and knowledge creation centers (universities, consulting firms and think tanks).

The uniqueness of logistics clusters and their contribution to economic growth are to be explained using the economies of scope (mainly for direct transport operations) and economies of volume (due to the possibilities of consolidating shipments with different modes of transport); joint provision of transport capacity and capacity for storage and processing of material products; providing opportunities for cooperation between suppliers in the presence of demand fluctuations. Their advantages are due to the creation of value chains. Such clusters provide many job opportunities (from low-skilled - to loaders, dispatchers, IT specialists, etc.), diversifying the economy, and supporting many other industries, for example, various production activities. Due to these reasons, along with numerous entrepreneurs in the real estate sector local and central governments invest in logistics clusters' development.

The operational advantages of the logistics cluster are expressed in the following:

- *Transport advantages*: economies of scale, scale of operations, and frequency of service.
- *Location advantages*. The geographic factor is of primary importance, as it is related to the offer of a certain type of transport service (Singapore - transshipment point for intercontinental sea transport; Rotterdam, Panama).
- *Temporary storage*, leading to optimal storage costs.
- *Intermodal connections*, etc.

The logistics cluster subsystems are the following:

- **Subsystem "Demand"**, which is essential in the cluster establishment. What matters here is the critical mass of the cluster over a given

time, including the number of firms joining, the number of firms leaving, and the number of firms at the end of a given time. In this case, the leading factor is "public trust".

- **Subsystem "Innovations"**, including new technologies, ICT, and promotion of electronic services (exchange of documents, other information, requests by electronic means, etc.).
- **Subsystem "Human resources"**. Modern logistics is knowledge-intensive, requiring university and other specialized training of human potential, as well as labor-intensive. Personnel recruitment and resource sharing are essential for synergy reasons, part of the synergy being the benefit from institutional support in measures to reduce pressure on the environment.
- **Subsystem "Investments"** (in terms of attracting, adoption, infrastructure development, etc.)

The developed sectoral activities of the cluster are transport (railway, maritime, and HVT), warehousing, and other auxiliary activities, within the emerging field of "Logistics service". The cluster strategy and action plan cover the following 5 joint areas:

- General marketing plan, with a tendency to support the growth of exports.
- Product development, by providing diversified service, based on capacity sharing, achieving a sustainable competitive advantage.
- Communications at the national level and within the sector - shared vision, trust, and common values.
- Development of ICT, through innovation and implementation of key technologies.
- Development of professional and higher education, with a view to the emergence of new professions and requirements for increased competencies

Support services are provided by the cluster in the field of internationalization, for market access in non-EU countries (in particular China, and Kazakhstan), to facilitate cooperation with partners from member states (in particular Finland, Sweden, and Latvia), promotion of

transparency and cooperation with other clusters (Estonian ICT cluster).

Among the negative effects of clustering in the case of logistics clusters is the increase in the intensity of competition, because of the presence of oversupply (Rivera, Gligor, & Sheffi, 2016). In general, however, logistics clusters have been studied less than industrial clusters.

3 BENCHMARKING AND ESTABLISHED PRACTICES IN LOGISTICS CLUSTERING

European best practices in the field of logistics clusters are represented by cluster entities in countries with long-term EU membership, for example, the Netherlands (Logistics Cluster in the Port of Rotterdam), but also by similar structures in newly acceded countries, for example, the Estonian Logistics Cluster (ELC, 2010). It is a joint initiative, with a mission dedicated to the international marketing of members' services, introducing Estonia's logistics advantages to target markets, R&D, and logistics education. The Estonian Logistics Cluster was launched in June 2010, initiated by the Ministry of Economy and Communications of Estonia³. The total number of members is 16, fourteen of which are SMEs (over 70%), and 2 university centers. The most prominent of them are Port of Tallinn, Estonian Railways, EVR Cargo, Alexela Logistics, Baltic Rail, Tallinn Technological University, Maynor Business School, Estonian Logistics and Transit Association (LTA), etc.

In Bulgaria, an intention to create an Intermodal transport and logistics cluster - Ruse was announced in 2014, including cooperation in the field of transport and logistics in the Ruse region, with participants Holding Bulgarian State Railways, wholly owned by the Bulgarian state, representatives of the academic community of the University of Ruse "Angel Kanchev", Executive Agency "Research and Maintenance of the Danube River", Shipping Company "Bulgarian River Navigation" JSC, Holleman Bulgaria, Ltd, Donau Transit Ltd, and other companies and organizations. A Cooperation Agreement has been signed, aiming to enhance interaction and improve the efficiency of activities within the

³ The cluster is a result of an implemented project, with 70% of the funds coming from the ERDF and 30% from

the members of the cluster (total value 185700 euros, for the period 15.01.2014 - 28.02.2015)

participating organizations and companies in the emerging cluster. However, no such cluster has been registered to date.

The Green Transport Cluster (GTC) (2011) is a non-profit association uniting the efforts of companies in the transport industry for the development of intermodal transport in Bulgaria and its accompanying activities. The main priority of the cluster is the integration of national intermodal transport and terminals in international intermodal networks, as well as the promotion of green transport corridors in Bulgaria. It is comprised of twenty-three members (GTC, 2023).

Among the projects in which GTC takes an active part are dedicated to the integration of the ferry complexes (Varna Railway and RoRo Burgas) and the Bulgarian Black Sea container terminals with the existing internal terminal in Sofia into a single logistics chain, as well as the expansion of cargo flows from third countries for the feeder and ferry operators. Some of the biggest Bulgarian transport and forwarding companies participate in the cluster, such as the Bulgarian Shipping Company Navibulgar, and Bulgarian River

Shipping JSC, which hold the intermodal terminals in the ports of Burgas and Vidin, Discordia, a leading road carrier in Bulgaria, DB Schenker Rail Bulgaria, Bulgarian Railway Company, Bulmarket DM Ltd., etc.

4 CONCLUSION

Logistics efficiency is vital to both international trade development and growth. A country's trading power depends on agents' access to transport and logistics networks. Better overall logistics performance is strongly associated with trade expansion, import and export diversification, investment attractiveness, and economic growth.

The above analysis highlights the potential of logistics clusters in stimulating economic activity and expanding opportunities for international trade.

Bearing in mind the importance of cluster development policy within the EU we recommend supplementary organization, financial, and operational efforts to develop clustering in the field of international logistics.

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GROUP REPLACEMENT AS MANAGEMENT ACTION IN MIRCE SCIENCE

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Abstract

The core principle of MIRCE Science revolves around the idea that the purpose of any working system is to perform work. The work is accomplished when a specific measurable function is carried out over time. All working systems require maintenance throughout their lifespan. It is generally understood that, during maintenance, the system is not actively performing any work. The duration and frequency of these tasks directly influence the amount of work lost due to maintenance. That work loss is known to have various consequences, such as monetary, reputational, or social implications. The main objective of this paper is to present how a proactive management approach, known as group replacement, can enhance work productivity compared to individual replacements. Under this strategy, the entire group must be replaced when any item within that group fails. This approach aims to minimize the number of maintenance tasks required and maximize the amount of work accomplished. The provided numerical example demonstrates the practical application of MIRCE Science in quantitatively evaluating the impact of group replacement on work productivity and resource allocation.

Keywords: *MIRCE Science, working systems, group replacements, maintenance management actions, MIRCE Functionability Equation, work done*

1 INTRODUCTION

The philosophy of MIRCE Science is based on the premise that the purpose of the existence of any working system is to do work. The work is done when the expected measurable function is performed through time. MIRCE Science focuses on the scientific understanding and description of the physical phenomena and human rules that govern the motion of working systems through MIRCE Space. An understanding of the mechanisms that generate this motion is essential

for the accurate predictions of the expected work done by a given working system type using the mathematical scheme of MIRCE Science (Knezevic, 2017).

That all working systems require some maintenance during their lives is generally accepted. The process during which the ability of a working system is retained or restored consists of a set of well-defined maintenance tasks. For these tasks' execution, resources like spares, materials, trained personnel, tools, equipment, maintenance manuals, facilities, software, and similar are needed (Knezevic, 1997). It is also commonly accepted that working systems do not do their job during maintenance operations

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because the expected functions are not performed. Thus, the amount of work lost due to maintenance is directly proportional to the duration of the maintenance tasks, the frequency of their demands, and the number of resources available. It is also commonly accepted that the amount of work lost has monetary, reputational, or social consequences.

In summary, the main objective of this paper is to expose the management community to the potential benefits of group replacement maintenance. Each management action impacts the functionability performance of working systems, like work done, resources consumed, lost revenue, profit generated, and so forth (Knezevic, 2016).

A numerical example presented in this paper illustrates the practical application of MIRCE Science to the quantitative prediction of the potential benefit of group replacement maintenance policy concerning the commonly applied maintenance practices.

2 MIRCE SCIENCE FUNDAMENTALS

According to MIRCE Science, at any instant of calendar time, a given in-service system could be in one of the following two macro states (Knezevic, 2017):

- Positive Functionability State (PFS - a generic name for a state in which a working system can deliver the expected measurable function(s)),
- Negative Functionability State (NFS - a generic name for a state in which a working system is unable to deliver the expected measurable function(s), resulting from any reason whatsoever).

In MIRCE Science, work done by a working system is uniquely defined by the trajectory generated by its motion through the MIRCE Space¹. That motion is driven by functionability actions, which are classified as:

- Negative Functionability Action (NFA - a generic name for any activity whatsoever that compels a system to move to an NFS).
- Positive Functionability Action (PFA - a generic name for any activity whatsoever that compels a system to move to a PFS).

The time evolution of a working system through MIRCE Space is physically manifested through the occurrences of functionability events, which are classified as:

- Positive Functionability Event (PFE - a generic name for any physically observable occurrence at which a working system moves from an NFS to a PFS),
- Negative Functionability Event (NFE - a generic name for any physically observable occurrence at which a working system moves from a PFS to an NFS).

To scientifically understand the mechanisms that generate functionability actions, positive and negative, analysis of the in-service behavior of several thousands of items, modules, and assemblies of in-service systems in defense, aerospace, nuclear, transportation, motorsport, communication, and other industries have been conducted at the MIRCE Academy.

2.1 MIRCE Functionability Equation

This multidimensional set of convolution integrals defines the motion of a working system through MIRCE Space, depicting and passing through each sequential functionability state in the direction of calendar time, generating a trajectory unique to each working system. Thus, the same set of generic equations, when applied to different operational and maintenance management actions generate different trajectories of the motion through the MIRCE Space, which means different functionability performances, namely different work done, and different resources consumed. Hence, Knezevic (2017) has created a generic platform on which each feasible set of operation and maintenance management actions would generate its own future "trajectory" for a working system under consideration.

¹ MIRCE Space is a conceptual 3-dimensional coordinate system depicting a probabilistic trajectory of the motion of a working system

through the MIRCE functionability field. (Knezevic, 2017)

According to MIRCE Science, a working system delivers expected work while it is PFS. According to Knezevic (2017) the probability of the working system being in PFS, at any instant of its in-service life, is determined by MIRCE Functionability Equation, $y_s(t)$ defined as (Knezevic, 2014):

$$y(t) = 1 - \sum_{i=1}^{\infty} F_S^i(t) + \sum_{i=1}^{\infty} O_S^i(t) \quad (1)$$

In equation 1, $F_S^i(t)$ is a negative functionability function. Mathematically, it is a cumulative distribution function of the random variable that represents the time to the occurrence of the i^{th} negative functionability event, $TNE_{S,i}^i(t)$ of a working system considered. In MIRCE Science it is defined by the following convolution integral:

$$F_S^i(t) = \int_0^t O_S^{i-1}(x) dF_{S,i}(t-x), \quad i=1, \infty \quad (2)$$

where: $F_{S,i}(t)$ is a cumulative distribution function of the random variable that mathematically represents the time to the occurrence of the i^{th} negative functionability event, $TNE_{S,i}(t)$ of a system considered.

In Eq. 1, $O_S^i(t)$ is a positive functionability function. Mathematically, it is a cumulative distribution function of the random variable that represents the time to the occurrence of the i^{th} positive functionability event, $TPE_{S,i}^i(t)$ of a system considered. In MIRCE Science it is defined by the following convolution integral:

$$O_S^i(t) = \int_0^t F_S^i(x) dO_{S,i}(t-x), \quad i=1, \infty \quad (3)$$

where: $O_{S,i}(t)$ is a cumulative distribution function of the random variable that mathematically represents the time to the occurrence of the i^{th} positive functionability event, $TPE_{S,i}(t)$ of a system or item considered.

In summary, it is essential to stress that the above-presented equations are generic mathematical interpretations of the physical reality of the motion

of working systems through MIRCE Space, resulting from any functionability actions whatsoever and the actions required to generate any functionability motion. However, the accuracy of their predictions is in the hands of their users, whose knowledge and understanding of the physical reality guide them to the selection of the most appropriate mathematical functions to represent the impacting natural and human actions.

2.2 Work done by working system in MIRCE Science

According to Knezevic (2017) the expected positive work to be done by a working system during a given interval of calendar time T , $PFW_S(T)$, measured in calendar hours, Hr, can be predicted by making use of the following equation:

$$PFW_S(T) = \int_0^T y_S(t) dt \quad [Hr] \quad (4)$$

The expected negative work to be done by a working system during a given interval of calendar time T , $NFW_S(T)$, measured in calendar hours, Hr, can be predicted by making use of the following equation:

$$NFW_S(T) = \int_0^T n_S(t) dt \quad [Hr] \quad (5)$$

where: $n_S(t)$ is a function in MIRCE Science that defines the probability of a working system being in NFS at any instant of in-service time t .

3 THE RATIONALE FOR GROUP REPLACEMENT MANAGEMENT ACTIONS

Individual replacement is a management action approach where each item in a working system is replaced after its failure, which means that it is fully utilized.

Group replacement is a management action where all individual items within a group designated are replaced after the failure of any of them. This practically means that replacement tasks of individual items from the group start at the same instance of time and are performed simultaneously. The group replacement task is completed when all the consistent replacements have been completed.

3.1 Group Replacement Strategy as Design Action

Group replacements of some items are often requested by the designers of functional systems. The most common reasons for group replacements are:

- Safety considerations of the working systems for users and the environment
- Technological constraints or limitations of the system.

For example, the replacement of all discs' pads, spark plugs, engine valves, and so forth in motor vehicles is requested when any one of them reaches its failed state.

Typically, group replacement's design actions are incorporated in their maintenance manuals and are a part of the warranty conditions, and as such they cannot be altered by in-service management actions.

3.2 Group Replacement Strategy as Management Action

To reduce work lost it is also possible to undertake group replacement of heterogeneous items so that when anyone fails, replacement of all the items from the designated group takes place. As the number of items in a replacement group, n_{igr} , increases the number of group replacements decreases because the total number of NFEs decreases. However, the cost of spare parts for each group replacement will increase because all the items will not be used to the full. At the same time, the total duration of group maintenance tasks would be shorter than the total time for the

equivalent work for the individual replacements, as the working system is already in a maintenance state. Hence, there must be an optimal management decision between these two competing alternatives, which would deliver the minimum work lost for the resources available.

A typical example of a group replacement task is the pit stop of a racing car, where tyre replacement, fuel refilling, and windscreen cleaning are performed simultaneously. This situation requires more maintenance resources and complex logistics, but it minimizes the consequential work lost. Hence, the replacements are performed simultaneously and the whole task is finished when all the consisting tasks are completed by the corresponding specialist members of the team or teams involved.

4 PLACING GROUP REPLACEMENT IN THE MIRCE FUNCTIONABILITY EQUATION

To assess the impact of group replacement, as a feasible management action, it is necessary to place it in the MIRCE Functionability Equation, defined by Eq. 1.

4.1 Negative functionability function for group replacement

The negative functionability function $F_{S,i,gr}(t)$ for the group replacement maintenance action, as a possible management action, is defined by the probability distribution of the random variable $TNE_{S,i,gr}$, and it is defined by the following expression:

$$F_{S,i,gr}(t) = P(TNE_{S,i,gr} \leq t) = 1 - \prod_{j=1}^{n_{igr}} [1 - F_j(t)] \quad (6)$$

where: $F_j(t)$ is a cumulative distribution function of the TNE of the j -th item within the group, driven by its negative functionability action. Thus, the above expression represents a probability that an NFE_{gr} , for the group of items, will take place before or at the instant of time t .

4.2 Positive functionability function for group replacement

The positive functionability function $O_{S,i,gr}(t)$ for the group replacement maintenance action, as a possible management action, is defined by the probability distribution of the random variable $TPE_{S,i,gr}$, and it is defined by the following expression:

$$O_{S,i,gr}(t) = P(TPE_{S,i,gr} \leq t) = \prod_{j=1}^{nigr} O_j(t) \quad (7)$$

where: $O_j(t)$ is a cumulative distribution function of the TPE of the j-th item within the group, driven by its positive functionality action. Thus, the above expression represents a probability that a PFE_{gr}, for the group of items, will take place before or at the instant of time t.

5 ILLUSTRATIVE EXAMPLE

To illustrate the applicability and practicality of the methodology proposed, a hypothetical example is used.

5.1 Management action challenge

The working system under consideration consists of three maintenance significant items, namely item-1, item-2, and item-3. The data related to the time of the occurrence of an NFE for items considered are given in Table 1.

Table 1: Time to NFE of maintenance significant items of the system considered.

Item	Distribution	Parameters	Unit
Item-1	Normal	60 12.0	Week
Item-2	Normal	80 16.5	Week
Item-3	Weibull	104 3.1	Week

Although the data presented in Table 1 are hypothetical it is necessary to stress that they could realistically represent the physical mechanism that generates occurrences of NFEs for the three items considered as they have time-dependent hazard functions, Knezevic (1993).

- for Item-1: $F_{1,j}(t) = \int_0^t \frac{1}{12.0\sqrt{2\pi}} \exp\left[-\frac{1}{2}\left(\frac{t-60}{12.0}\right)^2\right] dt = \Phi\left(\frac{t-60}{12.0}\right), j=1, \infty$
- for Item-2: $F_{2,j}(t) = \int_0^t \frac{1}{16.5\sqrt{2\pi}} \exp\left[-\frac{1}{2}\left(\frac{t-80}{16.5}\right)^2\right] dt = \Phi\left(\frac{t-80}{16.5}\right), j=1, \infty$
- for Item-3: $F_{3,j}(t) = 1 - \exp\left[-\left(\frac{t}{104}\right)^{3.1}\right], j=1, \infty$

where: Φ is the standard normal distribution function ($\mu=0, \sigma=1$), numerical values of which could be found in statistical tables for Normal distribution.

The impact of NFA on each item could be fully rectified by its replacement. The necessary data regarding that task stated are presented in Table 2.

Table 2: Time to PFE of maintenance significant items of the system considered.

Replacement Task	Distribution	Parameters	Units
Item 1	Normal	25 3	Day
Item 2	Weibull	39 4.2	Day
Item 3	Normal	55 5	Day

The management challenge highlighted in this example is the determination of the management action that will deliver the maximum possible output of the working system which is expected to be in operation for 5 years. The system operates in three shifts, seven days a week, which practically means that operational and maintenance resources are available all the time.

In summary, will the individual replacement of each failed item be the management action that will generate the highest output measured in working hours, or should the group replacement be a better management action?

5.2 Management action solution

The task of this example is to determine the amount of time that a working system will spend in PFS while continuously delivering expected functionality during 5 years of operation.

Making use of the data provided above, the negative functionality functions for the items considered are as follows:

The negative functionality functions for the group replacement of all three items, upon a failure of any of them, $F_{S,j,gr}(t)$ are defined by Eq. 6, thus:

$$F_{S,j,gr}(t) = 1 - \left[1 - \Phi\left(\frac{t-60}{12.0}\right) \right] \times \left[1 - \Phi\left(\frac{t-80}{16.5}\right) \right] \times \left\{ -\exp\left[-\left(\frac{t}{104}\right)^{3.1}\right] \right\}, \quad j = 1, \infty$$

Corresponding expressions for the time to the occurrence of PFE, due to the replacement of each item are given below, for the data from Table 2, thus:

- for Item-1: $O_{1,j}(t) = \int_0^t \frac{1}{3\sqrt{2\pi}} \exp\left[-\frac{1}{2}\left(\frac{t-25}{3}\right)^2\right] dt = \Phi\left(\frac{t-25}{3}\right), \quad j = 1, \infty$

- for Item-2: $O_{2,j}(t) = 1 - \exp\left[-\left(\frac{t}{39}\right)^{4.2}\right], \quad j = 1, \infty$

- for Item-3: $O_{3,j}(t) = \int_0^t \frac{1}{5\sqrt{2\pi}} \exp\left[-\frac{1}{2}\left(\frac{t-55}{5}\right)^2\right] dt = \Phi\left(\frac{t-55}{5}\right), \quad j = 1, \infty$

The positive functionability functions for the group replacement of all three items, upon a failure of any of them, $O_{S,j,gr}(t)$ are defined by expression (7), thus:

$$O_{S,j,gr}(t) = \Phi\left(\frac{t-25}{3}\right) \times \left\{ 1 - \exp\left[-\left(\frac{t}{39}\right)^{4.2}\right] \right\} \times \Phi\left(\frac{t-55}{5}\right), \quad j = 1, \infty$$

Dubi (2002) the possibility of finding an analytical solution for multidimensional convolution integrals defined by Eq. 2 and 3 is seldom possible due to the inability of mathematics to deal with the large number of convolution functions and their interactions. These types of problems are not specifically related to MIRCE Science, they are common to all scientific disciplines of this nature, as it is a known mathematical fact that integral equations do not have analytical solutions.

The most suitable way forward, according to Knezevic (2017), for any real working system, of any complexity of operational reality, is to apply the Monte Carlo method as the only viable

approach with which solutions for the MIRCE Functionability Equation and thereby the system performance may be obtained. It is applicable to systems with multiple interacting components, aging mechanisms, and any operation, maintenance, and support rules.

The final solution to the management challenge considered is obtained by the Monte Carlo method application as the only feasible solution for obtaining a quantitative answer to the MIRCE Functionability Equation. The results obtained are presented in Table 3. Group replacement is the preferential management decision for the challenge considered.

Table 3: Quantitative solutions for the management actions considered.

Failed item replacements	Management action		
	Individual	Group	Units
Expected PFW (260 weeks)	218.09	230.21	Week
	1,526.63	1,611.47	Day
	36,639.12	38,675.28	Hour
Effectiveness	0.83	0.88	n/a

It is necessary to stress that the quantitative and monetary values between the two management

actions have not been addressed in this example. However, it is easy to see the recommended

action applicable to all the cases where the value of extra resources is less than the value of the 2036 additional hours the working system considered will be in PFS doing the expected work.

6 CONCLUSION

The main objective of this paper is to show how group replacement could be used as a proactive management action for increasing the work done by working systems concerning individual replacements of failed items.

The philosophy of MIRCE Science is based on the premise that the purpose of the existence of any working system is to do work. The work is considered completed when the expected measurable function is performed through time. However, it is commonly accepted that all working systems require maintenance during their lives. It is also commonly accepted that while required maintenance tasks are performed, working systems do not work. Thus, the amount of work lost due to maintenance is directly proportional to the duration of maintenance tasks and the frequency of their demands. It is also commonly

accepted that the amount of work lost has monetary, reputational, or social consequences.

Group replacement is a management action where all individual items within a designated group are replaced after the failure of any of them. This practically means that replacement tasks of individual items from the group start at the same instance of time and are performed simultaneously. The group swap task is complete when all swaps are done.

A numerical example is presented to illustrate the practical application of MIRCE Science for the quantitative assessment of the impact of the group replacement on work done and resources committed by applying this management action. At the same time, the numerical example presented shows mathematical difficulties in finding quantitative solutions to multi-dimensional convolution integrals, which must be used to realistically represent the motion of a working system through functionality states concerning time. That is the only way to make accurate predictions of the expected functionality performances of designed and managed functional systems.

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INCREASING THE LEVEL OF COMPETENCIES OF OSH MANAGERS TO ENSURE HIGHER SECURITY AND PROSPERITY OF BUSINESSES

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Abstract

The essence of the contribution is to present the results of the analysis of current trends in the Occupational Health and Safety (OSH) managers' competencies and to propose a competence framework for OSH managers for the study program Crisis Management at the Faculty of Security Engineering (FSE UNIZA). The proposed framework respects the legislative, normative, and managerial requirements imposed on this position, resulting from current practice in Slovakia and global trends. The authors created a framework with the requirements for basic professional knowledge and skills in the field of OSH. Managerial knowledge, skills, tasks, responsibilities for performing activities, and the entire OSH management process are described. The position of OSH manager should be moved toward strategic management. OSH manager should bear responsibility for the entire OSH management process, i.e., design, manage, and control processes associated with the OSH management process.

Increasing the competence of health and safety managers will help companies minimize adverse impacts and increase prevention, safety, and company prosperity.

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1 INTRODUCTION

Security represents a crucial value for the company, which is the key to its prosperity and the achievement of the company's goals (According to Sak (2019), NIP 2023), security in the company is perceived as a state in which its existence, structure, or functions are not disturbed or threatened of the enterprise. From this point of view, it is necessary to perceive security comprehensively so the company and its values are not threatened. According to several authors (According to Gallimore 2022, Agnew 2023, Safety by Design 2021), safety is currently "declared as the highest priority of an organization". Businesses must take care of all areas of security about their business. In addition to the fact that companies must, as a priority, meet the conditions set by law regarding the areas of safety and health protection at work (OSH), they also implement management systems according to ISO 45001 for more effective compliance with all safety rules and the achievement of company goals.

Currently, the approach to OSH enforcement is changing, mainly due to political, economic, and social developments (IOSH 2022; NIOSH, 2022). The consequences of bad OSH management are far-reaching. They result in the loss of experienced people, extended absences, business interruption, increased work-related injuries, legal action, and rising insurance premiums. According to the ILO (2019), 2.78 million workers die each year from occupational accidents and diseases (of which 2.4 million are disease-related), and another 374 million workers suffer non-fatal occupational injuries. In addition to economic costs, there are intangible costs (which have not been fully taken into account in these figures), for human suffering caused by poor health and safety conditions. For companies to be able to prevent these consequences, it is necessary to have an effective mechanism in place that will ensure the correct approach of employers to the permanent increase in the level of health and safety in the company. Creating favorable working conditions and relationships affects the work process and has a positive economic effect (NIP, 2023).

According to Felknor et al. (2020), constantly increasing the level of health and safety brings loss reduction, higher productivity, efficiency, and quality of work, which affects the overall company performance and especially the safety of employees.

From the above, it follows that for an effective OSH management process to function in the company, it is necessary to ensure a professionally qualified manager with relevant managerial knowledge and skills in health and safety. The position of Occupational Health and Safety Manager (OHS Manager) should include the necessary professional competence and other competencies, i.e., knowledge, skills, and personality translations to ensure the entire OSH management process in the company.

2 OBJECTIVE AND METHODOLOGY

The paper aims to present the results of the analysis of current trends in the OSH managers' competencies and to propose a competence framework for the OSH manager for the study program Crisis Management at FSE UNIZA. The proposed framework respects the legislative, normative, and managerial requirements imposed on this position, resulting from current practice in Slovakia and global trends.

The analysis and comparison of previous findings on the occupational health and safety manager position confirms the high topicality of the issue. The key methodological source is our research aimed at determining the position of OSH managers in enterprises in Slovakia within the framework of the project APVV-20-0603 - Development of risk assessment tools for selected enterprises and professions in the Slovak Republic by EU requirements.

The authors used scientific methods to fulfill the stated goal of the paper:

- Basic baseline analysis of the current trends in the competencies of the OSH manager according to the processed results of international OSH institutions: IOSH - The Institution of Occupational Safety and Health,

EU-OSHA - the European Union Information Agency for Occupational Safety and Health, and others.

- Structured interviews and discussions with the OSH manager in a selected company in Slovakia.
- Analysis and assessment of the competencies of the OSH manager in the selected enterprise in Slovakia.
- Deduction and assessment of the findings for the occupational health and safety manager's competence framework proposal.
- Synthesis in the design of the competence framework of the OSH manager for the study program Crisis Management at the Faculty of Safety Engineering (FSE UNIZA (knowledge, skills, personal assumptions, tasks, and responsibilities).

2.1 Assessment of the competencies of OSH managers in the world

The Institution of Occupational Safety and Health (IOSH) is the world's authorized organization for occupational safety and health professionals. With more than 49,000 members in more than 130

countries, the institution is the world's largest professional organization for health safety (IOSH, 2022).

Following the strategic goals of improving, collaborating, and influencing, the IOSH institution set the condition to pay more attention to building skills throughout the profession. In 2022, they released an updated OSH manager competency framework after extensive research and consultation with OSH experts, employers, and other stakeholders. The updated framework reflects the significant changes that have occurred in the workplace over the past decade. Today's health and safety managers need balanced skills, knowledge, and behaviors to influence and manage change. That is more important than ever as economies recover from the global pandemic. The framework includes 69 competencies in three categories: technical, basic, and behavioral competencies of the OSH manager. The range and level of competence required for each specific role will vary and will depend on factors such as the sector, the individual's seniority or career level, and the size of the organization (IOSH, 2019, IOSH, 2022)



Fig. 1 The IOSH competency framework Occupational Health and Safety (OHS) Manager
Source: (Competency framework IOSH 2019, 2022)

The IOSH Competence Framework reflects current best practices in occupational safety and health. It is designed to be an actionable set of standards to help employees and employers maximize performance and minimize risk.

The competency framework provides a set of skills, knowledge, and behaviors that managers and employees can use to lead and take responsibility for their learning and development. Everyone's development needs will vary by role, level, and industry. Emphasis on specific core or behavioral competencies may vary between companies due to size, structure, or culture. The IOSH Competency Framework can improve performance by managing professional development and recruitment processes. Technical and core competencies focus on what the employee must do, while behavioral competencies provide clear guidance on how the employees should perform their roles. The competency framework can inform job descriptions, selection processes, and learning and development plans. It can also support performance management and help embed positive behavioral values that add value to employees' technical expertise (IOSH 2019, 2022):

A. Technical competencies of the OSH manager

This part of the framework includes a summary of OSH technical competencies that support the advisory capacity. They include an understanding of legislation, policy, risk management, incident management, and the impact of health, safety, and welfare on people. This section also includes new technical competencies such as sustainability, ethical practice, human capital, and community impact:

1. *Health and safety law*: Health and safety policy development; Principles of health and safety and other legislative frameworks; Health and safety governance; OSH management systems; Performance management; Health and safety auditing; Continuous improvement; Quality management.
2. *Risk management*: Horizon scanning; Risk identification and profiling; Risk assessment and analysis; Risk prioritization; Risk control,

mitigation, and resilience; Risk monitoring and reporting; Integrating health and safety risk into business risk processes; Occupational health and well-being; Business continuity.

3. *Incident management*: Incident management; Incident investigation; Incident reporting; Supporting a legal defense; Proficiency with incident cost analysis.
4. *Culture*: Organizational culture; Vulnerable workers; Employee welfare; Understanding of worker well-being; Health and safety competence; External visitors; suppliers and contractors; Responsiveness to changes in the modern workplace.
5. *Sustainability*: Sustainability; Human capital; Community impact; Financial sustainability; Ethical business practices.

B Core competencies of the OSH manager

It is a set of skills needed to support and enable good decision-making in the workplace. They include competencies related to strategy, planning, leadership, and management. These skills development will significantly increase the general effectiveness of the OSH manager.

6. *Strategy*: Strategy development; Business context (internal and external); Diversity and inclusion; Stakeholder management; Influencing; Knowledge management; Learning organization.
7. *Planning*: Planning and implementation; Financial management; Data analysis; Decision-making.
8. *Leadership and management*: Functional management; Visible leadership; Teamwork; Project management; Managing change; Conflict management.

C Behavioral competencies of the OSH manager

These competencies cover the way the OSH manager behaves in the workplace. They include working with stakeholders, ensuring good personal performance and professionalism, communicating, and working effectively with others. These competencies are the basis for building successful working relationships.

9. *Stakeholder management*: Collaboration; Being the 'trusted advisor'; Negotiating.

10. *Personal performance:* Personal responsibilities and accountabilities; Self-motivation and discipline; Prioritizing work; Driven by results; Problem-solving; Innovation and creativity.
11. *Communication:* Communicating effectively; Advocating for safety and inspiring people, providing constructive feedback; and Active listening.
12. *Cooperation with others Working with others:* Self-awareness; Commercial mindset; Empathy; Professional integrity; Coaching and mentoring.

2.2 Evaluation of the competences of the OSH manager in Slovakia

In the Slovak Republic, in small businesses, the position of health and safety manager is implemented in the form of outsourcing through safety and technical services. The safety and technical services provide the employer with consulting services in the field of professional, methodical, organizational, control, coordination, educational tasks, and other tasks in ensuring health and safety, especially in terms of the adequacy of workspaces and structures, work processes and work procedures, work tools and other technical equipment, work environment, and their technical, organizational and personnel security. In working conditions optimization, the safety and technical services influence the attitudes of the employer, managers, and employees towards safety and health protection at work (Act No. 124/2006 Coll.). A safety technician and an expert in prevention and protection in the specific field of safety and health protection perform the security services tasks in Slovakia. A safety technician is a natural person who possesses a valid certificate of professional competence as a safety technician issued by the National Labor Inspectorate. The legal requirements for obtaining a security technician are written explicitly in the law. However, the practice is demanding in many ways, and in some cases, there is also a cumulation of functions in safety.

In large enterprises, the position of health and safety manager is created and integrated into the structure of the enterprise. The OSH manager ensures compliance of business processes with

legislative requirements in the field of OSH. It ensures that the company meets OSH requirements, that the requirements are transferred into business processes using guidelines, work procedures, and other documents, and that these processes are executed properly. The health and safety manager is also in charge of managing risks arising from health protection, and his responsibility includes compliance reporting and negotiations with the authorities (NIP, 2022; BOZPO, 2022).

In Slovakia, the tasks and responsibilities of the OSH manager are defined as follows (Act No. 124/2006 Coll.; NIP, 2022), so the OSH manager:

- is responsible for creating a safety and health protection policy at work and for managing activities in the field of the environment by valid legislation,
- designs, manages, and controls the processes associated with the construction and development of the occupational health and safety management system,
- analyzes deficiencies identified in the framework of health and safety inspections and proposes corrective measures,
- analyzes work accidents, evaluates their causes, proposes measures to increase OSH,
- performs internal or external audits in the field of OSH management systems and environmental management systems,
- applies legislative requirements in the field of health and safety and the environment in the conditions of the organization,
- supervises the safe handling and storage of environmentally hazardous substances,
- identifies dangers and evaluates risks in the field of health and safety,
- identifies risks, environmental aspects, and impacts,
- proposes changes to work procedures and production technologies to minimize safety risks,
- familiarizes the employer, statutory bodies, and top management with the obligations of the organization according to regulations and standards in the field of health and safety,

- operatively solves problems and the organization of work in the event of breakdowns, accidents, floods, and other extraordinary events,
- orients himself on the legal regulations and technical standards in the field of health and safety and the field of the environment (water, air, waste, chemical substances, etc.),
- assesses and proposes changes to work procedures and production technologies about safety and hygiene regulations,
- assesses and evaluates technical and organizational ecological measures, prepares model systems of the impact of the organization's activities on the environment,
- assesses the planned production process, technologies, materials, substances, and investments from the point of view of environmental protection,
- examines individual cases of violations of standards and legal regulations in the field of the environment,
- checks the status and level of safety measures in the work process when taking over new machines, equipment, buildings, etc.
- performs verification and control of compliance with safety regulations, use of protective equipment, means, aids, and compliance with safety procedures,
- processes and submits complex reports in the fields of health and safety and the environment to the company management,
- proposes measures aimed at eliminating identified OSH and occupational hygiene risks,
- creates and issues company regulations and standards for safety and health at work and lists of risky workplaces,
- participates in negotiations with control and inspection bodies in the field of health and safety and the environment,
- issues binding instructions to ensure safe work for employees and workers of supplier organizations,
- ensures cooperation with the police force of the Slovak Republic and the state health and

- safety supervision authorities in the investigation of occupational accidents,
- provides training for employees of the organization and other persons, verifies the level of their knowledge in the field of OSH,
- realizes the fulfillment of selected obligations in the field of fire protection under valid legal regulations.

3 THE RESULTS

3.1 Analysis and assessment of the competencies of the OSH manager in a selected company in Slovakia

The authors analyzed the competencies of the OSH manager in a selected company in Slovakia. Their main activity is the production and sale of electricity. The company is the largest producer of electricity in Slovakia and one of the largest in Central Europe. In addition, it produces and sells heat and provides support services for the electricity system. The selected company in Slovakia operates 31 hydro-, two nuclear-, two thermal-, and two photovoltaic power plants with a total installed capacity of 4,143.8 MWe. The company's goal is to safely, reliably, efficiently, and competitively produce, sell, and trade electricity and heat, safely handle radioactive waste and spent nuclear fuel, and permanently reduce the impact of production processes on the environment. Thanks to a balanced composition of production resources in 2022, the company delivered almost 95% of electricity to the network without local carbon dioxide emissions (Selected Company in Slovakia, 2023).

3.2 Management of the OSH process in the selected enterprise

Selected company in Slovakia declares to adhere to principles and principles in the field of safety, health protection, fire protection, and prevention of serious industrial accidents. Safety, primarily nuclear safety and radiation protection as its integral part, are part of company management and are prioritized and permanently superior to production requirements and business profit. Every employee of the company is responsible for

safety within the scope of their competencies, responsibilities, and powers (Fig.2)

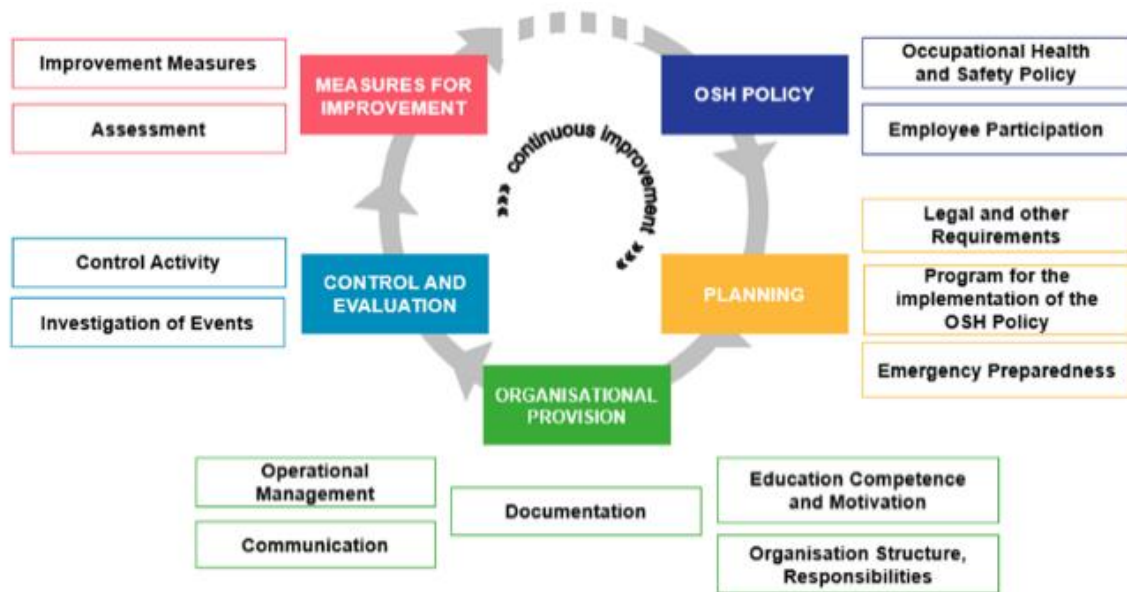


Fig. 2 Basic elements of the OSH management process (Mrasko, 2022)

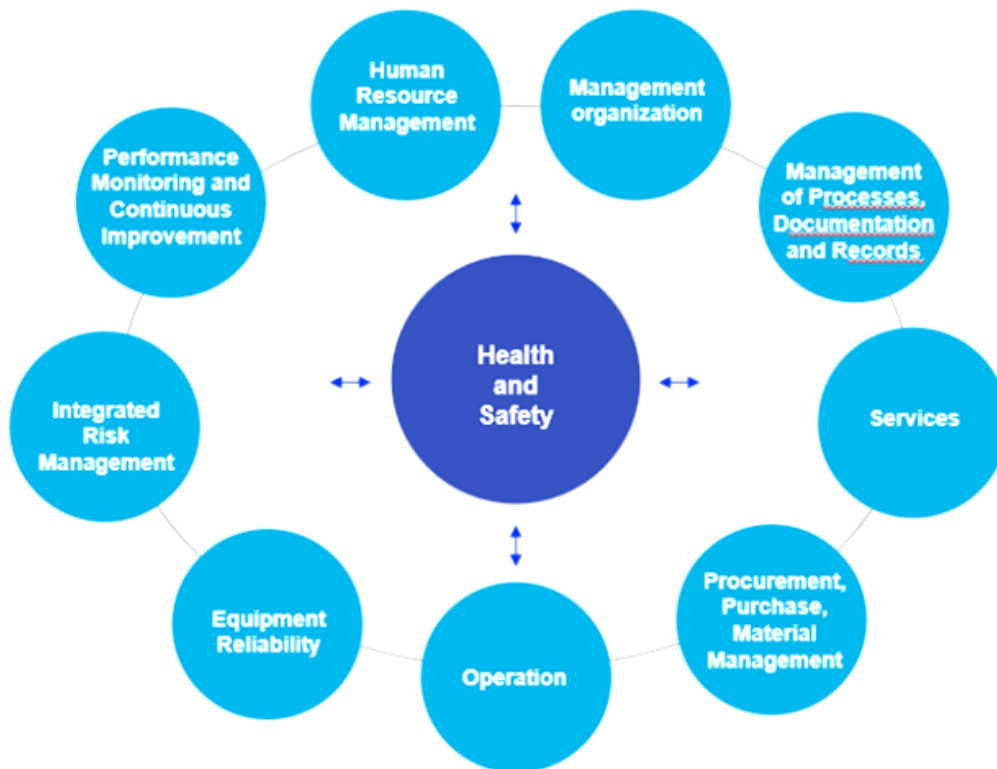


Fig. 3 Position of the OSH process in the organization management system (Mrasko, 2022).

In all activities, the principles of a safety culture and open communication are applied, within which workers can express themselves freely on safety issues without fear of retribution. In the preparation of technical measures and activities

related to the operation of nuclear facilities, the principles of the strategy of protection in depth are applied, aimed mainly at prevention but also at mitigating the consequences of potential risks.

Safety management is an integral part of the company's Integrated Management System, in which the responsibilities and powers of line managers are clearly and unambiguously determined. OSH management is a "cross-cutting process", i.e., it affects all activities and processes of the organization.

The company has an effective emergency preparedness system in place, including employee training, which is permanently maintained and regularly practiced. The selection, supervision, and evaluation of suppliers are carried out in terms of their approach to safety and fulfillment of qualification and quality requirements. An open dialogue with the public, with supervisory authorities and local and regional state and self-government bodies is implemented.

Suitable conditions are created for all employees of the company to protect their health while performing work activities. The company supports open communication and cooperation with employees, employee representatives for safety, the occupational health service, and the trade union body and motivates employees to participate in solving safety and health protection issues.

Work risks, as well as potential causes of serious industrial accidents, are identified and evaluated. Measures are taken for the assessed risks, which ensure a minimum level of risk in terms of safety and protection of health, the environment, and property. Measures and measurable goals for continuous improvement in the field of safety are established and communicated, aimed at minimizing the impact of the work environment on the health of workers and the incidence of occupational accidents and approaching the strategic goal of zero accidents. Adequate material and financial resources are spent on achieving safety goals and fulfilling safety requirements, principles, and principles, increasing the education, qualifications, and awareness of employees.

With the aim of continuous improvement, the latest knowledge and experience in safety and health protection are used constantly. The development of the production and technical base is oriented towards such electricity and heat production technologies that reduce the negative impact on

the safety and health of employees. By implementing and evaluating the security policy, the company declares that it meets all legislative and other requirements in the relevant areas (Occupational Safety and Health, 2023).

Table 1 is an example of the basic and extended competencies of the OSH manager in a selected company in Slovakia, to be, to (Mrasko, 2022):

- a secured state of working conditions that exclude or minimize the effect of dangerous and harmful factors of the work process and work environment on the health of employees,
- minimized the occurrence of work-related health damage (occupational accidents, occupational diseases) and events that threaten the safety and health of employees.

Table 1 An example of the basic and extended competencies of an OSH manager in a selected company in Slovakia (Mrasko, 2022)

OSH MANAGER BASIC COMPETENCIES	OSH MANAGER EXTENDED COMPETENCIES
RISK ASSESSMENT	
<ul style="list-style-type: none"> ▪ Identify hazards and threats, assess risk, and prepare a written document on risk assessment for all activities performed by employees 	<ul style="list-style-type: none"> ▪ Active participation of the manager in the process of risk assessment and creation of the output document ▪ Participates in risk management ▪ Communicates ▪ Look for opportunities (identified risk can also be an opportunity for improvement)
RISK ASSESSMENT PPE	
<ul style="list-style-type: none"> ▪ Develop a list of provided personal protective work equipment based on risk assessment and evaluation of hazards arising from the work process and the work environment ▪ Provide the necessary effective personal protective equipment free of charge to employees who require it to protect their life or 	<ul style="list-style-type: none"> ▪ Actively participate in hazard assessment and risk assessment ▪ Based on the processed list of PPE, ensure the physical provision of PPE (reservation, issue from the warehouse) ▪ Check the proper (and correct) use of PPE ▪ Checks subordinate senior employees from the point of view of fulfillment of the stated requirement

health and keep records of their provision <ul style="list-style-type: none"> Ensure proper use of PPE 	<ul style="list-style-type: none"> Does not accept cases of non-use of PPE
AWARENESS AND INFORMATION OF THE EMPLOYEES	
<ul style="list-style-type: none"> The employer is obliged to adjust the method of notification by internal regulation, to define the requirements for the professional competence of its employees for notification and the regularity of repeated notification so that it is carried out at least once every two years 	<ul style="list-style-type: none"> Ensure subordinate employees attend the briefing on the required date Check the participation of employees in the required notification Personally carry out specific types of familiarization (starting at the workplace, with instructions for use, with safe work procedures, with dangers and threats and the result of the risk assessment, etc.) Require feedback from employees on the completed familiarization
NOTIFYING AND INFORMING SUPPLIERS	
<ul style="list-style-type: none"> The employer is obliged to ensure that the employees of another employer and natural persons who are entrepreneurs and are not employers, who will perform work at his workplaces and on his premises, receive the necessary information and instructions to ensure safety and health protection at work valid for his workplaces and premises. 	<ul style="list-style-type: none"> Ensure the supplier's participation in the initial training Ensure that the induction briefing is carried out at the workplace Ensure the provision of process and operational documentation necessary for the safe performance of work Uniform approach "employee" vs. "supplier"
MEDICAL ABILITY	
<ul style="list-style-type: none"> Classify employees for the performance of work concerning their health status, especially the result of the assessment of their health fitness for work, abilities, their age, and do not allow them to perform work that does not correspond to their health status, especially the result of 	<ul style="list-style-type: none"> Ensure the participation of employees in preventive medical examinations The result of the preventive medical examination should be taken into account in the work.

the assessment of their health fitness for work	
CONTROL ACTIVITY	
<ul style="list-style-type: none"> The employer is obliged to constantly check and require compliance with legal regulations and other regulations to ensure safety and health protection at work, principles of safe work, health protection at the workplace, and safe work procedures 	<ul style="list-style-type: none"> Carry out errand checks of the senior employee (planned and unplanned), record their results Daily, check how subordinate employees comply with safety regulations Also, use the Institute of Observations Regularly evaluate the results and outputs of control activities with subordinate senior employees and other employees Ensure the timely removal of identified deficiencies

3.3 Proposal of the competence framework of the OSH manager for the crisis management study program at FSE UNIZA

The proposed OSH manager competence framework for the study program Crisis Management at FSE UNIZA respects the current global trends established in institutions dealing with OSH issues (IOSH, 2022; EU-OSHA, 2022; ILO, 2022; ILO 2021; ACCA, 2021; VUBP, 2022), practice requirements (Mrasko, 2022), legislative requirements (Act No. 124/2006 Coll.), normative requirements (ISO 45001, 2018), as well as other managerial requirements placed on this OSH position in the Slovak Republic. The framework was created based on the long-term experience of the authors of the contribution from solving scientific research projects at FSE UNIZA, e.g., APVV-20-0603 - Development of risk assessment tools for selected enterprises and professions in the Slovak Republic by EU requirements.

Knowledge about the changing conditions in the external and internal environment of companies, risks in health and safety, and previous experience from the educational process as well as from the application of graduates in practice was also an important source. The essence of the framework is created and describes requirements for basic professional knowledge and skills in the field of health and safety, knowledge and skills in

risk management, managerial knowledge and skills, tasks and responsibilities for carrying out activities and the entire process of health and safety management., fig. 4., tab. 2.



Fig. 4 Competence framework of the OSH manager for the Crisis Management study program at FSE UNIZA

Table. 2 Competence framework of the OSH manager

COMPETENCE FRAMEWORK OF THE OSH MANAGER FOR THE CRISIS MANAGEMENT STUDY PROGRAM AT FSE UNIZA	
KNOWLEDGE IN OSH	
<ul style="list-style-type: none"> safety and health protection at work, work safety, legal regulations in the field of health and safety (e.g. Act No. 124/2006 Coll. on health and safety and on amendments to certain laws as amended and others), OSH management system according to ISO 45,000, security of technical systems, principles of safe operation of technical equipment, working environment and working conditions, 	<ul style="list-style-type: none"> work accidents and occupational diseases, categorization of works, environmental management (types of waste and their impact on the environment), environmental protection, environmental regulations, environmental management system ISO 14001, prevention of industrial accidents - causes and solutions of emergencies fire protection.
SKILLS IN OSH	
<ul style="list-style-type: none"> create, enforce, and develop an OSH policy, 	<ul style="list-style-type: none"> check, record, and report work accidents and occupational diseases

<ul style="list-style-type: none"> apply legal and other regulations in the field of health and safety, introduce and update the OSH management system in the company, monitor changes in legislative and normative OHS requirements, identify dangers and threats in the company, apply the principles of technical safety in the performance of the OSH manager, 	<ul style="list-style-type: none"> communicate with control authorities, check the effectiveness of preventive health and safety checks at workplaces, check the completeness and up-to-dateness of OSH documentation, evaluate the economic effectiveness of the OSH management system, implement training in the field of health and safety.
KNOWLEDGE OF RISK MANAGEMENT	
<ul style="list-style-type: none"> risk management, OSH risk management, identification, analysis, and evaluation of risks in OSH, proposal of measures to reduce the assessed risks in OSH, monitoring and reporting to top management, 	<ul style="list-style-type: none"> risk management methods and techniques, OSH audits, creation of OSH risk management documentation, creating a register of health and safety risks, integration of security risks into business management processes (quality, finance, production, HR...)
RISK MANAGEMENT SKILLS	
<ul style="list-style-type: none"> the ability to identify, analyze, and evaluate health and safety risks, master risk management methods, techniques, and tools, the skill to monitor sources of OSH risks, propose measures to reduce OSH risks, 	<ul style="list-style-type: none"> the ability to enforce measures to reduce OSH risks, skills in applying the principles of risk management in the field of health and safety. assessment of suitability and effectiveness of proposed measures to minimize OSH risks
MANAGERIAL KNOWLEDGE	
<ul style="list-style-type: none"> Management - from planning, strategy development, organizing, leading people, control, decision-making, communication, motivation, Crisis management – accidents Quality management, Audits, continuous improvement, Production management, 	<ul style="list-style-type: none"> Operational processes, technological procedures, Change management, Business continuity management, Project management, Personnel management - conflict management, Financial management, Information systems, data analysis.

MANAGERIAL SKILLS	
<ul style="list-style-type: none"> ▪ to forecast and recognize in time the effects of changes in the external and internal environment of the company, ▪ decide on adjustments to procedures, processes, and OSH resources to meet the set goals, ▪ objectively implement and evaluate health and safety audits, ▪ reveal deficiencies in the field of health and safety and propose measures to eliminate them. ▪ Investigate and eliminate disagreements in the field of health and safety, 	<ul style="list-style-type: none"> ▪ coordinate cooperation with other processes in the company, ▪ propose solutions to adjust the goals in OSH, ▪ propose measures to improve and innovate the OSH management system, ▪ create and enforce a culture of risks and safety in the company, ▪ assess interpersonal relationships at the workplace, ▪ motivate (inspire) and effectively communicate with workers about health and safety issues.
PERSONALITY PREREQUISITES AND OTHER SKILLS	
<ul style="list-style-type: none"> ▪ analyzing and solving problems, ▪ communication (dealing with people, ability to express, listening, negotiation), ▪ providing constructive feedback, ▪ coping with stressful situations, ▪ teamwork, ▪ empathy, ▪ intuition for detecting possible risks, 	<ul style="list-style-type: none"> ▪ flexibility in thinking (adaptability, flexibility...), ▪ financial literacy, ▪ creativity (creativity), ▪ information literacy, ▪ professional integrity, ▪ ethical business practices, ▪ organizing and planning work, ▪ personality development.
OTHER QUALIFICATION PREREQUISITES FOR THE OSH MANAGER	
<ul style="list-style-type: none"> ▪ Safety technician certificate according to law c. 124/2006 Coll. on health and safety and on amendments to specific laws, as amended, 	<ul style="list-style-type: none"> ▪ higher education in the field, ▪ intermediate English language. etc.

4 CONCLUSIONS

The benefit of the contribution is the presentation of results from:

- analyzes the competencies of OSH managers according to the world organization IOSH, which created them through extensive research, consultations with OSH experts, employers, and interested parties as well as from other sources.
- evaluation of the competencies of the OSH manager in Slovakia,
- assessment of the competencies of the OSH manager in the selected company in Slovakia,
- proposal of the competence framework (knowledge, skills, personality requirements) of the OSH manager for the study program Crisis Management at FSE UNIZA.

If companies want to ensure more safety and prosperity, they must constantly improve the health and safety of employees and create a safe working environment and working conditions. It follows from the above that FSE UNIZA responded to global changes and new requirements of the OSH manager and incorporated them on time into the accredited study program Crisis Management, i.e. that the graduates of that program are ready to perform the job position of OSH manager, respecting current global trends, practical requirements as well as legislative and normative requirements in the field of OSH in the Slovak Republic. The position of OSH manager should be a permanent job performed by theoretical training and practice. It was supposed to be directed to strategic management and bear responsibility for the entire OSH management process.

Increasing the competence of health and safety managers will help companies minimize adverse impacts and increase the prevention, safety, and prosperity of companies. The processed results contribute to the development of the discussion about the current competencies of OSH managers, not only in Slovakia but also in the world. The authors of the paper want to contribute to raising awareness of the effective management of the OSH process, paying more attention to OSH risk management and its significant impact on businesses and the entire society.

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OPINION OF GENERATION Y - HAS NORTH MACEDONIA SUCCESSFULLY DEALT WITH THE TOURISM CRISIS 2020-2022?

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Abstract

Crisis events represent a costly threat to businesses in the tourism sector. Tourism companies have long recognized the importance of crisis management and realized that their passive attitude toward possible crises can negatively affect their work. Despite this knowledge, many of them are not prepared for a quick response and do not have mechanisms that can indicate that danger early. For those reasons, the need to write this paper arose, intending to provide tourism enterprises with an appropriate tool for successfully fighting against crises. This paper's main goal was to determine the opinion of Generation Y about "Were we able to deal with the crisis in the tourism sector in the Republic of North Macedonia in the period 2020-2022?". For this purpose, the authors did narrative research using secondary sources of information and empirical research about the problem. After processing the data and their visualization through tables and graphs, based on the results of the empirical research, the authors presented their conclusions and recommendations for appropriate actions in dealing with the crises encountered by the enterprises that belong to the tourism sector.

Keywords: *tourism, strategies, crisis management, organizational wrongdoing, personal perception*

1 INTRODUCTION

Tourism represents a very significant activity within the economic system of North Macedonia and is a normal part of our daily life. The positive

effects of tourism are diverse. For tourists, a holiday means satisfaction as travel allows them to bring their hopes and dreams to life. Furthermore, by taking a holiday outside their usual surroundings, tourists consciously and unconsciously increase their knowledge of other cultures and ways of life.

Tourism enterprises are of great importance for the employment of the labor force. They are an

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efficient means of reducing unemployment and an excellent source for generating a large income. Thus, their impact on the creation of the country's gross domestic product is significant, so they are of great importance for the development of economies.

All of this would've been nice if there were no crises. A crisis negatively affects the functioning of all segments of everyday life. Nowadays, as well as in the past few years, we have witnessed events that have had and are still creating huge problems in the overall economic system functioning, including the tourism sector.

For this paper, we dwell on only three such events, namely, SARS-CoV-2, the Energy Crisis, and the War in Ukraine.

As a result of the spread of SARS-19, many tourist attractions worldwide, such as museums, amusement parks, and sports venues, were closed. It was also the case with the Republic of North Macedonia. Many large enterprises worldwide have been suspended or shut down permanently due to the heavy impact of COVID-19 (Cloyne, 2020).

A second manifestation of the crisis is the number of tourists who visit North Macedonia and spend at least one night. According to the State Statistics Office, before the pandemic outbreak in 2019, the total number of tourists was 1,184,963. With the pandemic beginning in 2020, that number drops to 467,514 tourists. In 2021, the number increased to 702,463 tourists. It was still significantly less than before the pandemic. Stabilization of the situation occurred in 2022 when that number rose to 969,295 tourists¹.

Then, a new problem arose, the energy crisis. Its consequences are still being felt. As a result of various factors, justified or speculative, the price of electricity significantly increased in recent periods. One can see it best from the data obtained from the HUPX exchange based in Budapest, Hungary, where we used the period from 2019-2022. What was the spot hourly price movement according to the Hungarian stock exchange, in the period from 2019-2022, with the

minimum, maximum, and average price noted in the respective year, can be seen in Table 1.

Table 1. Price of electricity in the period 2019-2022 (in euros)

No.	Year	Minimal	Maximal	Average
1.	2019	0	138,82	50,36
2.	2020	-8,12	150,02	39,00
3.	2021	-35	620,00	113,86
4.	2022	-2,56	1047,10	271,66

Source: (hupx, 2023)

What we see is a huge price increase in 2022. The reasons lie in the intention that the production of electricity from fossil fuels and atomic energy is eliminated and replaced by renewable sources that are currently unable to meet the needs. Another incident that affected the price and its dramatic increase is the war in Ukraine. It caused a reduction in production in certain parts of Ukraine that distributed large amounts of electricity to the rest of Europe.

The high electricity prices on the world energy market influenced the adoption of a decision by the Regulatory Commission for Energy of the Republic of North Macedonia. According to it, four tariff blocks are determined. Because tourist facilities are large electricity consumers (in quantum), they entered the 4th tariff block with dramatically higher prices. That further affected the energy costs for tourist facilities.

All these three phenomena harm the functioning of tourist companies. We can say with certainty that tourism companies are facing a crisis that affects their performance. Also, in the newly emerging situation, tourism companies face organizational errors and changes in personal understanding. There is a great fear for their future, a real possibility of job loss, and the termination of their functioning. On the other hand, if they decide to reduce the scope of their operations and lay off employees, this may have repercussions in the future with operating at a loss, but also with the inability to provide the necessary workforce in periods when the situation will normalize. Namely, employees who will lose their jobs may reorient themselves to other

¹ www. Stat.gov.mk Database MakStat

activities, look for work in other companies or countries, etc. It will be a huge problem for tourism enterprises to provide the necessary, quality, and trained workforce to perform the activities in this sector.

An effective managerial response to crises in the functioning of tourist companies is needed to eliminate the consequences of these negative influences. These activities are crucial for effective institutional functioning. Novelli et al (2018) concluded that there is a real possibility of getting out of a tourism crisis, according to which, after crises, the tourism industry usually rebounds, which shows that the tourism industry has obvious resilience in alleviating the collapse of demand or supply.

For tourism enterprises to function effectively and efficiently again, their management should take appropriate actions. We can call these activities simply - crisis management. As a function, crisis management describes the actual implementation of an action plan as well as the adaptation of existing tasks and business processes in the case of an acute crisis (Glaesser, 2003).

Crisis management must be an integral part of an organization's contingency planning (Sapriel, 2003). As such, crisis management needs to be treated as part of businesses' mainstream functions, not as an ancillary activity.

Over time, manifestations of tourism crises mainly include economic and financial crises, political conflicts and instability, and public health and safety issues (Fotiadis, et al., 2021). For those reasons, it is crucial to recognize that crisis response strategies can involve functional communication and actions, including information that helps stakeholders avoid harm, in addition to more symbolic management efforts that attempt to manage the organization's public image (Bundy & Pfarrer, 2015). An encompassing interpretation of what is meant by 'tourism crisis management' is made by Santana (2004: 308): "Tourism crisis management one can define as 'the wide-ranging efforts of various organizations to understand and prevent crises and effectively manage the crises that occur, taking into account every step of the planning activities and the interests of their stakeholders'". When talking about tourism, the activities that should be undertaken, according to various authors, are as follows. According to

(Evans & Elphick, 2005:148), the activities that should be undertaken include the preparation of a detailed contingency plan, defining decisional and informational roles and responsibilities, and retaining a degree of flexibility to react swiftly and decisively at an operational level but not to rush into more strategic level decision-making. According to Blythe (2002), the crisis management process includes the following steps: analysis of possible weak points, assessment of existing procedures, identification of new procedures that need to be changed to remove weak points, organization of a crisis management plan, use of the prepared plan, and constant control of processes and weak points. According to Millar & Heath (2004), good crisis management includes three elements: an action plan, the existence of an early warning system to signal a potential crisis, and the company must have a crisis management team that can successfully deal with the crisis.

An appropriate plan should be made for crisis management to be efficient and effective. It includes the following activities (MacDougall, A. et al., 2016):

- Key team members in finance, legal, and security matters are ready to take immediate action in all aspects of the crisis.
- A communication plan that contains a detailed schedule of activities and includes the existence of a spokesperson for public relations.
- A detailed review of the cooperation of all information verification teams.
- Consideration of the possible impact of the crisis on all stakeholders, such as employees, shareholders, suppliers, and other business partners.
- A recovery plan that will allow the company to return to its original state as quickly as possible.

A very significant activity is the formation of the crisis team. The crisis management team must cover a variety of factors aimed at fighting and reducing the damage caused by the crisis. A crisis management team is a department in an organization that manages problems or issues generated by major events that have a bad impact

on the company (Smith, 2000). Therefore, this team will respond quickly and bring some solutions to help the organization recover from the event and meet dynamic and urgent demands effectively and immediately (Moon et al., 2020). Withers et al (2012) suggested that a quality board may reduce the impact of a crisis and enhance leadership efforts.

Here we must refer to the competencies that the members of the crisis management should possess.

Psychological nature skills are significant together with tools used to analyze key events in a crisis, including the amount of control over the event, the extent to which the event can affect the enterprise, the extent of damage done, and the duration of symptoms.

A specific focus is placed on leadership in all phases of the crisis existence to build a team, lead the team, establish teamwork, and maintain high work standards. The importance of the ability to work under pressure is also emphasized.

The crisis team members should possess a high self-motivational ability to predict future situations. They must be loyal, have a high level of professionalism, the ability to notice details, and be consistent and trustworthy, summarizes Schein, E.H. (2010).

Finally, the main question is whether the same management that brought the company into the crisis can also be the bearer of crisis management. About that question, there is no single answer, but two solutions are given (Postolov, 2011: 288):

1. The top management that brought the company into a crisis cannot be the bearer of the crisis management activities.
2. According to the second opinion, top management should be used to get the company out of the crisis.

2 METHODOLOGY OF RESEARCH

Most of the surveys the authors conducted online, to distribute forms to a larger number of respondents, in a shorter time and with lower costs and due to complete anonymity, since the probability of receiving more honest answers is

much higher, although some of the distributed questionnaires were also personally made.

Within the research and about the sample, the following rules were accepted:

1. People who belong to the so-called Generation Y (people born between 1980 and 1996).
2. Regarding the level of education, only people with an academic education were included, regardless of the level.
3. To obtain relevant data and results, the authors determined the sample size to be over 50 respondents.

The questionnaire consisted of 2 parts with a total of 11 questions, of which the first (Section 1) set of 3 questions referred to the respondents' data, including age limit, gender, and level of education, while (Section 2) a set of questions referred to some aspects related to the functioning of tourist enterprises in the conditions of a crisis caused by the pandemic, energy dependence and the war in Ukraine. The questionnaire used the Likert scale for the second part. The respondents expressed their agreement or disagreement through a five-point scale (1 = 'I do not agree at all', 2 = 'I partially disagree', 3 = 'Neutral' (neither agree nor disagree), 4 = 'Partially agree', 5 = 'Completely agree'), but also yes/no questions and structured interview.

3 RESULTS OF THE EMPIRICAL RESEARCH

The first table we constructed is related to the demographic characteristics of the respondents, in terms of gender, level of education, and age. A total of 51 respondents were surveyed. Based on the obtained data, we constructed Table 2.

According to the influence levels of running a business, we classify the crises into 'serious crises' and 'crash crises', we can see the answers in Graph 1.

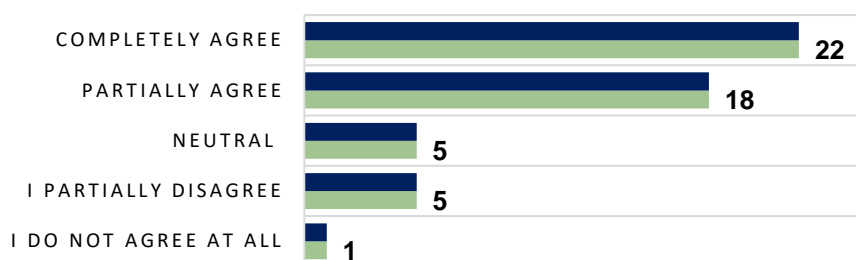
Based on the received data, we notice that a larger number of respondents agree with the given statement.

We constructed the following table based on the received answers to several questions and obtained a mean score.

Table 2. Sample

Sex	
Male	24
Female	27
Level of education	
Graduated	45
Master	5
Ph.D.	1
Age	
Under 25	20
Between 25 and 30	28
Between 31-36	3

Source: Author's research



Graph 1. According to the influence levels of running a business, we classify the crisis into a serious and crash crisis.

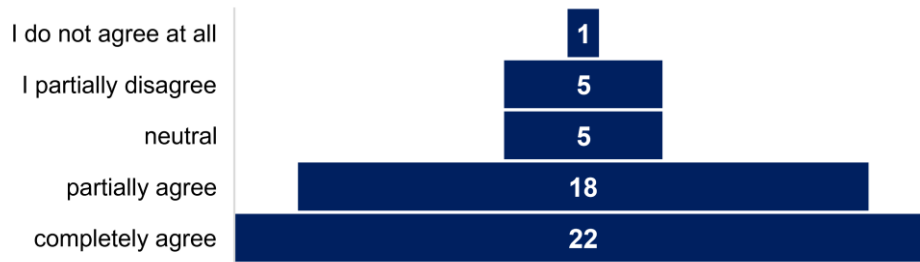
Sources: Authors' research

Table 3. Organizational issues related to the crisis.

No.	Constation	Do not agree at all. (1)	Partially disagree. (2)	Neutral (3)	Partially agree. (4)	Completely agree. (5)	Result
1.	To establish the "enterprise crisis management system"-necessity	22	12	10	6	1	2.06
2.	Need to solve the crisis immediately	3	12	18	10	8	3.16
3.	When a company has a crisis, it should have a special department to handle with responsibility to do so	20	20	11	0	0	1.82
4.	After the crisis is over, my company is changing the way it works to avoid conditions for a new crisis	12	14	18	5	2	2.43
5.	Operation Procedure (plan) concerning crisis management, dealing team, definition, goal, operation procedure, operation handbook, and efficiently measure the performance of management	22	20	8	0	1	1.78
6.	Have you introduced changes in the way your company works?	0	5	15	21	10	3.71

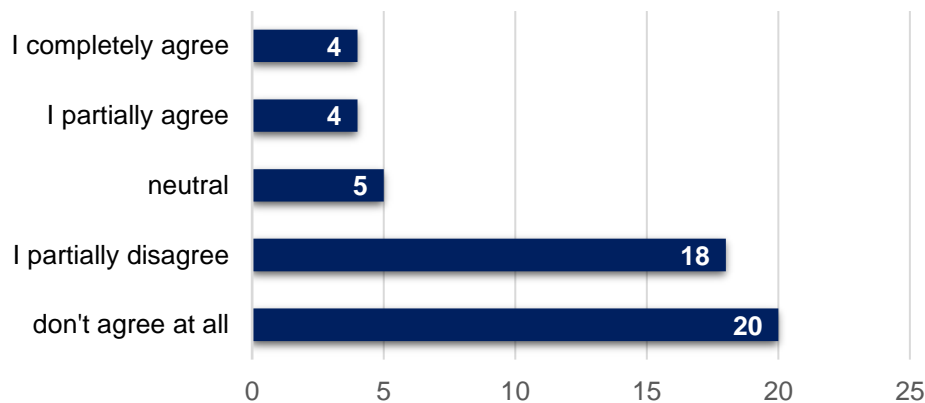
Source: Authors' research

The next two questions are related to whether to use external or internal crisis managers to deal with the situation. We can see the answers from the following two graphs:



Graph 2. Do you think that external experts such as professional advisers, lawyers, and financial experts are ready to deal with any crisis?

Source: Authors' research

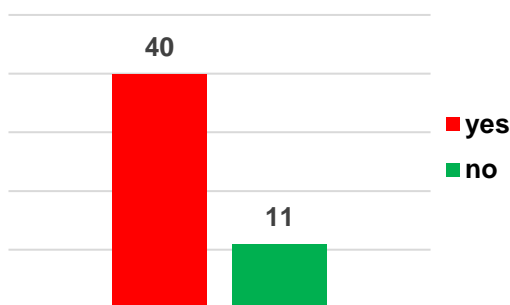


Graph 3. Do you think that in your company some managers and leaders are ready to deal with any crisis?

Source: Authors' research

The last two questions are related to the status of the employees, that is, whether they were fired, as well as the reasons for that situation.

We can see the results of the received answers in the following two views:



Graph 4. Have you fired employees?

Source: Authors' research

Table 4. For what reasons are employees fired? (Only companies that have a reduced number of employees are eligible)

Answers	Number of answers
Reduced workload	29
Canceled orders	32
Payment difficulties	36
Fixed-term work	35

Source: Authors' research

4 FINDINGS AND RECOMMENDATIONS

Regarding the first question, and according to the influence levels of running a business, we classify the crisis into serious and crash crisis, the respondents to this question declared with a high degree of agreement that we had a serious crisis - the percentage of people who completely or partially agree is about 78.5%. Consequently, we

believe that those people had a high degree of understanding of the situation and the need to take appropriate actions to remove those deviations in the operation.

Regarding the findings from the group "Organizational issues related to the crisis", we conclude that the obtained weighted results are in the interval of 1.78–3.71. The answers to some questions from this group show a low level of perception among the respondents. Therefore, a recommendation is imposed to undertake appropriate measures and activities that will enable effective and efficient functioning and reduction of the negative consequences of the crisis.

The next group of questions was related to the use of external or internal crisis managers to deal with the situation. From the received responses we can see that respondents believe more in solving the challenge by external crisis managers.

If the current management succeeds in reducing the negative consequences of the situation with its activities, our position is that it can also be a crisis management team. But if there is an impossibility for proper management by the current management team, then, in our opinion, there is a need to use external crisis managers.

The last group of questions was related to whether employees were fired and what were the reasons for that. Based on the obtained results, unfortunately, we can state that 78.5% of the respondents answered that there is such a phenomenon.

However, was it the right decision? The following few findings point in the direction that it was not. First, these are people who have specific work skills and knowledge; therefore, their replacement will take a long time. Second, there is a possibility of a fluctuation of employees from the tourism sector to countries that need this kind of human resource and are prepared to pay more, compared to hiring them in their domestic countries. Finally, those managers must ask themselves whether after firing these employees, they will become more resistant to returning to their old jobs, which creates the impossibility of quality performance of this activity.

Based on our findings, a significant recommendation is that it is a management skill to find a way to retain employees.

5 CONCLUDING CONSIDERATIONS

1. Tourism companies are of great importance for workforce employment and are an effective means of reducing unemployment. They are potential employers who, due to the specificity of the activity they deal with, must be in all parts of a country, and in which labor is engaged, thus reducing unemployment. Also, this type of enterprise provides certain types of services and products. Finally, they are an excellent source for generating a large income, which makes their impact on the creation of the country's gross domestic product significantly felt, so they are of great importance for the development of economies.
2. As shown in this paper, tourism enterprises operated in the conditions of the SARS-CoV-2 pandemic, the energy crisis, and the war in Ukraine for a long time. All those external factors affect the efficiency and effectiveness of their operation with negative impacts on several dimensions of their operation. It implied a reduction in the number of tourists, with a simultaneous cost increase because of the listed unexpected unfavorable events.
3. Tourism companies must apply crisis management methods and tools to eliminate the negative consequences of these unfavorable events. Crisis management is a process that includes many intertwined activities. All activities aim at achieving a common goal, ensuring effectiveness and efficiency. Tourism companies must consider several dimensions. First, one must possess a certain level of knowledge about the characteristics and principles of operation of tourist enterprises in crisis conditions. Therefore, knowing the essence and content, i.e., the characteristics and principles of functioning, suits everyone. It is appropriate not only for managers who manage companies but also for employees, who, knowing the basic features, can more effectively align their own goals and interests with common goals and interests.

4. In crisis management, managers must determine the threat level before taking the next steps in crisis elimination. After defining the character of the crisis, the next steps are taken in terms of planning to get out of the situation, determining the team, taking appropriate actions, and the time frame. A highly treated issue in that process must be related to employees. They must accept the situation the enterprise finds itself in, which may require taking painful action on their income and possibly employment status. There is no optimal solution in that process. But in our opinion, the management should take action to find a way to retain employees, which creates employee loyalty to the company.

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DEVELOPMENT OF THE TOURISM INDUSTRY IN THE SOUTH OF RUSSIA UNDER CONDITIONS OF RESTRICTIONS

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Abstract

The growth of investments in tourism and increase in production due to increased tourist demand has a positive synergistic effect on all sectors of the country's economy. That encourages investment activity, the creation of new jobs, the expansion of trade, and an increase in wages. A part of the income comes through taxes to the state budget. A synergistic effect occurs consequently. This research showed that the system of organization and development of the tourist services market represents a combination of financial and economic structures, models, and management methods. With the help of it, social, group coordination, and private interest arising from the growth of the tourist product market are achieved. The paper presents the methods and tools that enable the assessment of the region's competitiveness in the tourist and recreational services provisions and an overview of the main factors that influence the demand for these services. The consistency and objectivity of the considered problems in their mutual connection and interdependence are ensured by considering general economic principles and methods

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of analyzing the legality of economic development, logical analysis, decision theory methods, set theory, historical method, abstract-logical method, statistical methods (consideration of indicators in

dynamics, grouping, method of detailing), methods of comparison, comparison, etc. The study is based on economic literature, works of contemporary scientists, the legislative framework of the Russian Federation, materials of state statistical authorities, materials of scientific conferences, and the information potential of the Internet.

Keywords: *tourism, recreation, socio-economic efficiency, competitiveness of the region, transport infrastructure, regional development*

1 INTRODUCTION

The South of Russia is traditionally a tourist and recreational area. The presence of a wide variety of natural and recreational support for tourism and the sanatorium and resort sector objectively forms a steady demand from the population for the provision of rehabilitation and recreation services and determines the current macroeconomic situation in the region.

The South of Russia is characterized by a significant variety of conditions and factors that determine the formation of tourist and recreational complexes. The regions of the Russian South differ significantly from each other depending on the geographical location, natural and socio-economic conditions, the peculiarities of the geopolitical situation, the level of development and use of tourist and recreational, and the specialization of tourist centers.

If we talk about natural prerequisites, they are most favorable in the Krasnodar Territory, which has access to the southern warm seas (Black, Azov). The Black Sea coast has a Mediterranean subtropical climate. The mountainous areas of the extreme northwestern part of the Caucasus Range are characterized by low seismicity and the presence of unique places, the tourism facilities that are actively being developed. The Azov coast is becoming a developing tourism zone. In the region, the development of sources of therapeutic mud is underway.

The second most recreational value in the South of Russia is the Stavropol Territory, or rather, a group of Caucasian mineral water resorts, which have healing waters of world importance.

In the Rostov region, the recreational zone is represented in the Sea of Azov and the mouth of the Don. Other places are represented by "point" centers of tourism. They are located mainly along the Don River and its tributaries.

In the Astrakhan and Volgograd regions, recreational activities are concentrated mainly along the Volga River. Many cultural and historical sites stand out here, in particular, the military-patriotic complex "Mamayev Kurgan" in Volgograd and the Astrakhan Kremlin, as well as the reserve at the mouth of the Volga River.

In the Southern Federal District, Adygea has conditions for the development of mountain tourism and river rafting, important transit highways from the Center to the Black Sea coast pass through it, and in Kalmykia, there is the largest Buddhist temple in Russia in the city of Elista. The latter is one of the international chess centers.

The republics of the North Caucasus have opportunities for mountain tourism development, including in winter. In Karachay-Cherkessia there are Dombay and Teberda; in Kabardino-Balkaria - the Elbrus region; in North Ossetia-Alania - the Tsey Gorge.

The Chechen Republic and the Republic of Dagestan have significant recreational opportunities. In Dagestan, this is the Caspian zone, especially Makhachkala and Derbent with its famous ancient fortress Naryn-Kala and some mountain settlements: Gunib, Kubachi, Untsukul, etc. In Chechnya and Ingushetia, a few places have been preserved almost in their original form due to their remoteness and inaccessibility. These include Lake Kezenoy-Am, the largest in the highlands of the North Caucasus, and objects of cultural heritage of the Vainakhs (medieval towers).

2 RESULTS AND ANALYSIS

According to the Federal State Statistics Service of the Russian Federation (Rosstat, 2023), the southern regions account for 24% of all tourist trips to the Russian Federation in 2022, which in numerical terms corresponds to 37 million trips.

A feature of the resorts of the South of Russia is their focus on domestic tourism. Only a small part of the places of recreation can be attributed to the locations of the international level. This fact was one of the reasons that the sanctions imposed by several countries against Russia had practically no effect on reducing the flow of tourists to the regions under study.

Now, considering the political situation in the RF (pandemic, difficulty traveling abroad, sanctions, etc.), the tourism sector of the South of Russia is experiencing a rise and revival. We assume that the proceeds from the provision of travel services will be used for:

- the region's infrastructure development,
- introduction of the innovative technologies,
- the personnel retraining, and
- the fixed assets re-equipment.

In this case, the southern resorts of Russia will become competitive and take their rightful place in the global tourist market.

Thus, if we talk about the regional level of economic development, the regional authorities should pay serious attention to the developments in the tourist and recreational spheres.

Due to the geopolitical situation in the RF and the world, almost all regions in the Russian Federation have significant reserves for the growth of gross regional product due to the contribution component of domestic tourism. That is, the development of the tourism sector can be chosen as a kind of economic "shock absorber" both in the regions and in microregions.

When forming a program for enhancing entrepreneurial activity in the field of domestic tourism of territories, it is recommended at the *initial stage* to determine the system of factors affecting the sphere of regional tourism. The assessment result represents a detailed study of environmental factors and tourist infrastructure, with an analysis of the degree of influence of each factor on the development of tourism in the region.

In the next stage, an analysis of the available resources, strengths and weaknesses, and recreational opportunities of the tourist and recreational complex of the region should be

carried out. After the strengths and weaknesses of the recreational opportunities of the region are identified, it is crucial to identify priority areas of tourism that may be associated with:

- Natural resources.
- Anthropogenic resources
- Combined resources.

Using this classification, directives for the tourist services market development were formed on the example of the Republic of Adygea, shown in Figure 1.

As a result of the assessments carried out at the third stage, a map of STEP analysis is formed (analysis carried out by establishing expert assessments for each factor according to the principle of significance for the object under study).

The map shown in Figure 2 reads as follows: the cultural and educational direction of tourism covers both zones 4 and 3. Therefore, to increase the percentage of success (getting into the 4th zone), it is necessary to attract sufficient funds for the repair of museums and the construction of tourist accommodations. Active areas of tourism (for example, extreme sports) are in the 4th and 3rd zones since there is very high competition in this area in the region. For a complete transition to zone 4, you need to provide a detailed assortment of leisure activities in this area and effective marketing. Agritourism is in zone 3. It has a lower potential than the other directions have since the region currently has no successful experience in this type of tourism.

In the fourth stage, it is necessary to identify the factors of socio-economic efficiency that may appear because of the development of the industry (Table 1).

Even though the state at the federal and regional levels supports the development of the tourism industry, this area is still at an insufficiently high level of development and requires investment risky investments. The internal competition in the RF forces the regions to compete for tourists and quickly adapt to changing conditions. The last stage of the analysis is the determination of the associated risks.

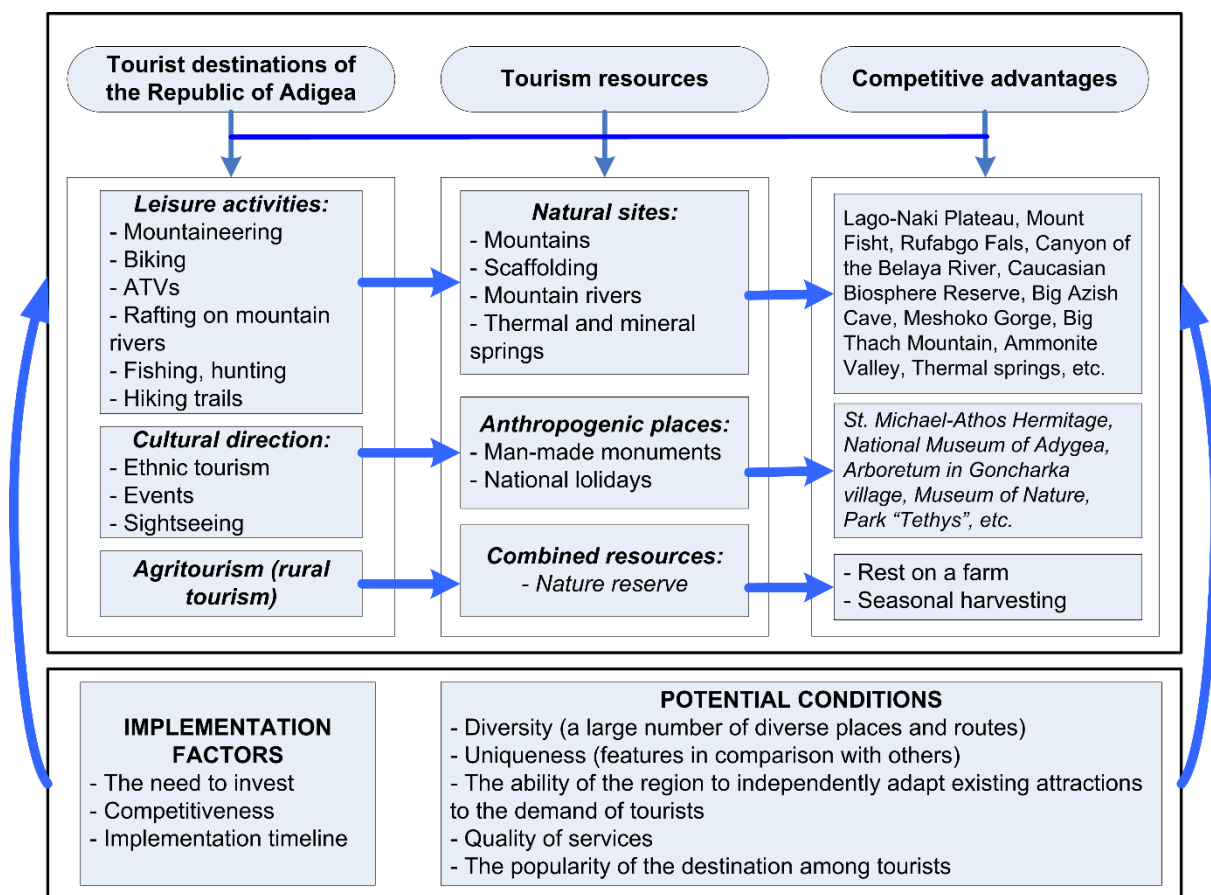


Figure 1 - The system of directions for the development of the market of tourist services in the example of the Republic of Adygea

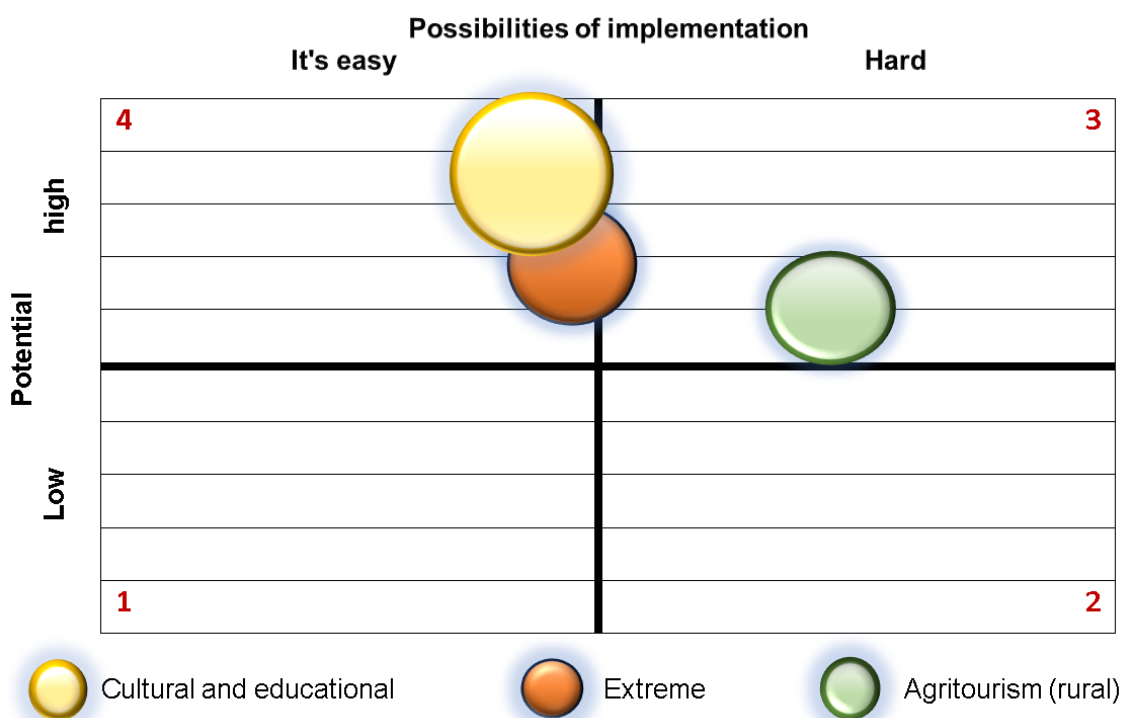


Figure 2 - Vector of development of the main types of tourism in the Republic of Adygea

Table 1 Factors of socio-economic efficiency.

Social sphere	Economic sphere
<ul style="list-style-type: none"> - Creation of new jobs - Infrastructure improvement. - Reduction of migration. - Improving the imposed by many medical services - Increase in the level of qualification of personnel. - Appearance of the area improvement. 	<ul style="list-style-type: none"> - Increase in the local budget. - Attraction of investments. - Growth in revenues. - Development of social infrastructure.

The following are the possible risks of business structures in the tourism sector:

- Dependence on the weather.
- Increase in the price level.
- Tightening of tax policy.
- The race for profit can lead to losing the territory's identity.
- Reduction of state support. The region will be financed at the expense of profits from the tourism sector development.
- Growth of intra-regional competition.
- Migration outflow.
- Lack of labor resources with appropriate qualifications.
- Increasing instability in the environment because of human intervention and the intensification of many natural manifestations of climate.
- The problem with waste disposal.
- After the analysis, the top management of business structures providing services in the tourism market, at the fifth stage, it is necessary to form a decision-making map regarding alternative options for the development of business processes.

It should be noted that the above approach to the formation of management decisions in the business structure operating in the market of tourist services allows us to assess, among other things, the recreational potential of the region, since the information obtained in the first four stages can be further used by regional authorities to develop a strategy for enhancing entrepreneurship in tourism.

When assessing the prospects for the development of the tourism industry in a particular region, in addition to expert approaches, various factors, and evaluation indices can be considered.

The main barriers and obstacles to the sustainable development of the country's tourism and recreation industry include:

- lack of investment in the tourism sector,
- low level of competence,
- insufficient promotion of the country's tourism industry for both foreign citizens and residents of the country,
- low level of infrastructure, including transport,
- visa restrictions.

An important factor in the development of the tourism industry in the region is the transport and logistics accessibility of recreation areas.

As noted earlier (Prigoda, Cekerevac, & Alikaeva, 2023), the closure of the skies over Europe for Russian aircraft led to a decrease in passenger traffic in traditional Russian international air harbors (Domodedovo lost more than 15% of passengers, Vnukovo - almost 9%, Sheremetyevo - just over 7%). At the same time, regional air hubs showed a positive result, the passengers of which mainly chose Russian regions for recreation, such as:

- Zhukovsky + 50%
- Mineral waters +27.5%
- Irkutsk +25%
- Makhachkala +23.6%
- Barnaul +20.5%
- Sochi + 17%, etc.

Mineralnye Vody and Sochi took over the traffic of 11 temporarily closed southern airports. Irkutsk, Makhachkala, and Barnaul correspond to the most popular points on the map of domestic tourism: Baikal, Dagestan, and Altai.

Regional air hubs were opened to actively expand the route network for domestic tourism, as an alternative to foreign tourism. The transport accessibility of the regions, provided by its route network, reveals the potential of the constituent entities of the Russian Federation and contributes to their economic development. It also allows you to solve important social problems and open new opportunities for tourists.

The experience of developing new hubs has been successful. Thus, Sochi Airport became the most popular destination for Russian travelers in 2022 among all the carriers' base air harbors: more than 388 thousand people used flights to the south of the country. (Huttunen, 2022)

One of the elements of the transport infrastructure that allows the development of domestic tourism is rail transport. According to the official website of Russian Railways, 3.4 thousand additional train departures were scheduled in the summer

season of 2023, which is 25% more than a year earlier. (Railways, 2023) The most popular cities for travel have traditionally been Adler, Anapa, Novorossiysk and Kislovodsk, located in the South of Russia.

According to Russian Railways, compared to last year, the demand for transportation in the summer increased by almost 20%. To meet demand, the company started using the new timetable in May, adding additional regular departures on existing lines and planning trains that did not run before. (Figure 3)

For example, new double-decker trains were introduced into the schedule with the message Ufa - Imereti Resort, Samara - Anapa, as well as the international train Minsk - Samara and others. In total, the holding has prepared almost 6,000 wagons for transportation to the south of Russia.

According to the company's internal estimates, from May to September 2023, Russian Railways carried more than 50 million passengers, of which more than 11 million were in the direction of the South of Russia. This is more than in the summer of 2022 when demand was also very high.

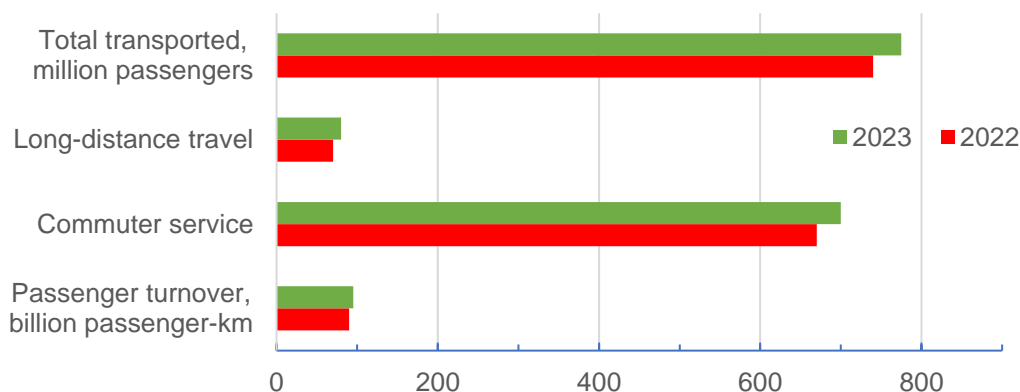


Figure 3 - Passenger traffic in Russia (Data for January-August 2022 vs January-August 2023), million passengers.

Source (Railways, 2023)

In 2023, between May and September, 6.5 million travel documents were issued by passengers.

For several years in a row, the holding has been covering the high demand for trips in the summer. In 2022, more than 1.5 thousand additional train departures were promptly assigned to ensure transport accessibility of the southern resorts. In addition, from August 1, 2022, Russian Railways, together with Aeroflot, implemented a combined

transportation project according to the "airplane + train" scheme - for the convenience of passengers, the routes of the three Lastochka electric trains were extended to the Sochi Airport station.

With the transition to the market, the state retained more leverage in the infrastructure than in the manufacturing sector. This means that the development of transport is becoming the most

important element of economic management and a factor in the development of territories, with the same priorities of the state transport policy - the preservation of a single transport space, nature protection, and ensuring the safety of transport activities. (Čekerevac, 2022) Further development of digital technologies in transport infrastructure will allow the tourist and recreational areas of the South of Russia to reach a new level of development, making them more accessible. (Reunova, Namitokova, & Alikeeva, 2023)

Significant risks of implementing tourism development strategies and programs in Russia are the deterioration of the geopolitical situation and the possible increase in sanctions pressure on the Russian economy from Western countries. The implementation of the above risks may negatively affect the image of the Russian Federation as a tourist territory and reduce the positive effect of promoting Russian tourism products on the international market. In this regard, an urgent problem is the development of competitive tourism products and the creation of places of attraction for tourists to develop domestic tourism. (Ashinova, 2023)

In addition, the pattern of economic relations between all participants in the tourism market is fundamentally changing in the context of digitalization, including between government bodies regulating tourism activities, and between producers and consumers of tourism and hotel services. Thus, the process of developing a new economic business model for the hospitality and tourism industry in the form of an ecosystem seems to be a priority direction for the further development of the recreational sector. (Eshugova & Kadakoeva, 2021)

3 CONCLUSION

The above study showed:

- The main problems of the study of recreational potential include the rise in the cost of tourist services, traffic congestion, especially in the summer, insufficient development of the

service, and high environmental load per unit area.

- The recreational potential of the southern regions is characterized by significant resource supply, an excess labor market, which is included in recreational activities, as well as dense communication support.
- In the economic system of Russia, its southern subjects, along with tourist and recreational specialization, are distinguished by a diversified agro-industrial complex, which closely interacts with recreation.
- The prospects for further development of the regions of the South of Russia are mainly associated with the search for more economical ways to improve the recreational potential, considering local opportunities and an effective investment policy.

Currently, progressive activities in 3 areas are growing in the tourism and recreation sector.

- The first group consists of administrative innovations associated with the growth of firms and tourism businesses in the mechanism and composition of management.
- The second is marketing innovations that make it possible to study and meet the desires of old consumers or attract new customers.
- The periodic innovations that change the consumer characteristics of tourist goods belong to the third group.

Therefore, progressive activities in the field of tourism focus on the development of a new, or the improvement of an old product.

The main features that affect the future of tourism and recreation include aggregate and sectoral factors: competition, digitalization, and political and societal development requirements. At the same time, tourist and recreational supply and demand largely depend on changing conditions, such as economic growth, the impact of state policy, and demographic and social changes. We can conclude that the increase in competition in the supply and demand market can be a trend in the tourism and recreation industry.

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SOME INFORMATION COMMUNICATION TECHNOLOGIES IN LOGISTICS AND SUPPLY CHAINS

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Abstract

The digitization process, imposed by the rapid development of electronics, the Internet, the availability of IT, new software, devices, networks, and platforms, is gaining an almost unlimited reach. The concept of process visualization initially appeared as a comprehensive term for obtaining and using data and information with the application of new information and communication technologies (ICT) in the economy and beyond, intending to fully characterize the process with specific key performance indicators (KPI), which would enable its users to better insight into the state of their processes, vehicles, devices, people, at any time, from any place, according to the principle of each-and-everyone. The paper presents systematized communication technologies and services in the cloud that are in use or under development. The division into groups of technologies was made according to the functions significant in logistics and supply chains. Some of the technologies analyzed are described in brief. The work aims to present to businessmen and researchers some of the new technologies that are significant for their areas of business and interest so that they can direct their activities toward that area.

Keywords: Management, logistics, supply chain, services, cloud technology.

1 INTRODUCTION

The term Industry 4.0 first appeared in 2011 in Germany. It is a term that interprets the vision of the future *Smart factory*. It can be defined as the embedding of sensors into smart devices and integrating them into digital and physical processes for direct communication. The essence is in the application of IoT, which represents the

comprehensive connection of machines, products, systems, and people for mutual communication in the virtual market, managing each other, and creating a continuous connection between the virtual and physical world regardless of geographical and organizational boundaries. In parallel with the development of I4.0, the complexity of logistics also developed. Nowadays, Logistics 4.0 is in development aiming to become Smart logistics, which means Smart products and Smart services and requires the application of automatic storage and sorting systems with new

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software for managing warehouses, intelligent containers, greater use of self-propelled vehicles (AGV), the application of Robot-as-a-service (RaS) robots, drones for monitoring inventory status with faster scanning of bar codes from cargo, etc., which will fully support intelligent production. Work technology in supply chains (SC) develops in parallel with logistics. Now, SC4.0 requires the application of IoT/IIoT, the use of robotics, the use of Smart Environment Sensor (SenS) and SenS+, which are specific stereoscopic cameras for detecting obstacles during the operation of machinery and vehicles in intralogistics, machines and devices in production, the application of predictive analytics with the possibility of processing a large amount of data from all SC processes and for all users, the application of as much automation as possible, AI/ML, Blockchain and others. According to (Salem, 2018), the variety of devices and their interoperability requires mutual free communication, security, simplicity of installation, and ease of use. The author particularly mentions the importance of standardization of data and applications with a full-control approach (controlled, inoperable, or open source).

Digital transformation is the most significant business trend of our time and includes digital transformation:

- within a company through the digitalization of its business functions (bookkeeping, finance, TPS processes, digital self-driving vehicles...),
- between the company and its clients through the digitalization and transformation of relationship management to customers, marketing automation, electronic commercial business (E-com), through electronic ordering and payment, electronic data processing and exchange, electronic catalogs, etc.), and
- throughout the entire value chain of business networks, from suppliers of materials and finished products, procurement processes, distribution partners, banks, end users, and everyone participating in the global SC.

2 COMMUNICATION TECHNOLOGY IN LOGISTICS AND SUPPLY CHAINS

As a concept, network technology IoV (Internet of Vehicles) is a part of IoT/IIoT and represents the fastest-growing technology today. It is realized in most cases by the wireless transmission for analysis and data processing between different devices via communication networks (GSM, UMTS, HSPA, HSDPA, and LTE), hosting units for data processing, the user interface for data access, and their processing and analysis. Many communication technologies have been developed or are developing for the one-way or two-way exchange of data and information under the general name of Vehicle-to-Anything/Everything (V2X/C2X)¹ and Cellular Vehicle-of-Everything (C-V2X) radio technologies between vehicles and other entities that can affect the movement of the vehicle or vice versa. A series of specific communication technologies have been developed or are in development. Some examples are (Tahir, Leviakangas, & Katz, 2022):

- Vehicle-to-vehicle (V2V), direct vehicle-to-vehicle communication, with the exchange of data and information in real-time with vehicles from the immediate environment at distances of up to 300m. The technology is used to transmit and receive data about current vehicle locations, speed between vehicles, and safe traffic communication, according to the ISO/TS 19091:2019 standard, are:
- Vehicle-to-infrastructure (V2I)/I2V or Vehicle-to-Roadside (V2R) communication with the infrastructure elements of the road (light signaling, line markers, parking space restrictions, etc.).
- Vehicle-to-pedestrian (V2P), communication with pedestrians and cyclists.
- Vehicle-to-network (V2N) technology enables the communication between cars, trucks, buses, traffic signals, and lanes, and unexpected events on the road with obtaining directions for further movement using mobile wireless networks such as Long-Term

¹ Depending on the language, two terms with the same meaning V (Vehicle, in the USA, in further notation) and C (Car, in Europe) are used.

Evolution (LTE), 3G but above all 4G) or C-V2X communication based on a cellular network (5GTN-5G Test Network)/IEEE 802.11p.

- Vehicle-to-grid (V2G) technology is still being developed. The idea is to use batteries in electric cars and trucks more efficiently as power sources in the electrical grid based on real-time power requirements. For energy exchange between electric vehicles (EVs and V2G batteries) and the public electricity grid, it is necessary to share the positional coordinates of the vehicle in communications:
 - Vehicle-to-building (V2B) energy exchange during the movement of the vehicle to the workplace (business building),
 - Vehicle-to-home (V2H) at home (apartment) when parking and
 - Vehicle-to-load (V2L), exchange at transshipment, loading and unloading points in warehouses and terminals.

V2B and V2H support energy use in private homes and commercial buildings, while V2G responds to network conditions and thus supports the network. These technologies' application increases energy efficiency, and the total capacity of electricity production improves stability, reliability, and network efficiency. Bidirectional electronic converters, namely AC-DC (BADC) and DC-DC (BDC) are commonly used for easier G2V and V2G power transfer between the grid and EV battery. Bi-directional converters have been successfully developed and implemented in V2G systems. They help to achieve very efficient energy conversion. The growth of such converters and charging stations will help transition from conventional to electric vehicles, and ultimately lead to a green environment.

- Brain-to-vehicle (B2V), a technology pioneered by Nissan that connects the driver's brain to his car, still is not in use. This technology could radically change the future of driving and traffic safety.
- Platooning, the technology will connect two or more goods vehicles in a caravan to reduce fuel consumption and CO₂ emissions, improve

safety with automatic braking, and increase efficiency.

- Vehicle-to-device (V2D), talking from vehicle to device via Bluetooth/Wi-Fi Direct, Apple CarPlay, and Google Android Auto applications,
- Vehicle-to-cloud (V2C), communication in the cloud about vehicle diagnostics and maintenance via electronic control unit Diagnostics over Internet Protocol (DiIP).
- Infrastructure-to-infrastructure(I2I) is a communication between infrastructural elements that are in contact with each other, placed on the road, and through which information about traffic situation control, traffic jams, and traffic accidents is delivered.

In SC, the situation is somewhat more complex because there are several subjects in the business organization: the cargo owner as the sender or his forwarder, the consumer as the end user of the goods (cargo), state authorities, customs, control, and insurance companies, etc.) and logistics providers providing different services from 1PL-5PL, Figure 1.

Business-to-business (B2B) technology refers to trade between companies on a wholesale basis. Close connected is the B2B subclass Business-to-employee (B2E), where the traffic focuses on managing activities within the company. If the business process involves a company and the retailer, it can be considered as the Business-to-client (B2C) model.

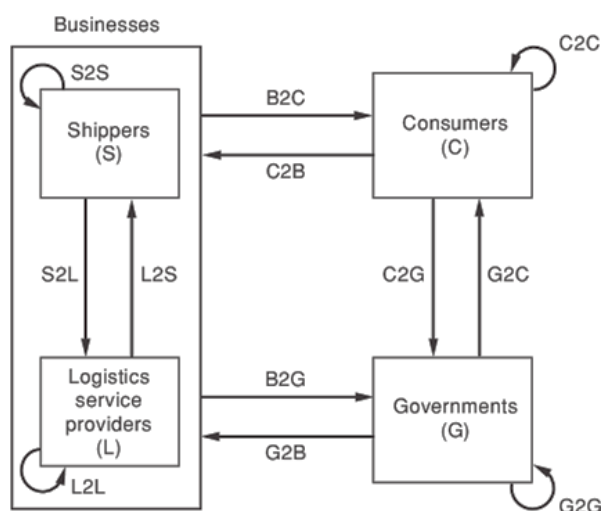


Figure 1. Possible forms of communication in logistics and supply chains
Source: (Yoshimoto & Nemoto, 2005)

In the transaction between the company and the end user, in the Direct-to-consumer or Direct 2 Consumer (D2C) notation, the transaction is carried out without intermediaries, where the companies will build, market, sell, and deliver the product directly to the customer at a lower prices than the intermediaries who use traditional retail business models and maintain end-to-end control of business operations. In commercial business, it is often necessary to provide the appropriate documentation accompanying the goods from state authorities, such as transit permits, quality certificates, insurance of goods, etc., whereby companies communicate with state authorities that issue documents, and vice versa. Such technologies are Business-to-Government (B2G), Customer-to-Government (C2G), Government-to-Customer (G2C) and (Government-to-Government (G2G). Consumer-to-Consumer (C2C) technology), achieved when wholesalers directly sell goods or services to end consumers online and perform consulting services, various auctions and transactions, personal services, etc., and all by the Law on Electronic Commerce. The mentioned communication technologies are implemented in both directions, directly P2P (Peer-to-Peer) and online via the Internet.

3 SERVICE APPLICATIONS IN THE CLOUD

Recently, the integration of computing into Cloud Computing Services (CCS) has been increasing, achieving elasticity in the use of the service. It is based on the pay-per-use principle and low financial inputs but results in shorter service time, change of responsibility in risk management, and easy accessibility. Complex and huge calculations are shortened, and demand for storage space is reduced. Management is without expensive hardware infrastructure, expensive software systems, etc. The paradigm of Everything-as-a-service (XaaS) implies computing in the cloud in which the services of various business functions companies provide with the use of appropriate tools, software, infrastructure, databases, etc. The paradigm of Everything-as-a-service (XaaS) implies computing in the cloud in which the services of various business functions companies provide with the use of appropriate tools, software, infrastructure, databases, etc. the Application Service Provider (ASP), Cloud Service Provider

(CSP), Complete Solutions Provider, or Communication Service Provider (CSP) (Duan, et al., 2016). It is very significant to choose a quality CSP provider that can adapt and manage existing and develop new cloud and general business applications, IIoT, and batch computing/processing. Sharma, Chang, Tim, Wong, and Gadia (2019) proposed a CNNC classification based on the intuitiveness of the scientific approach. They considered two types of service applications. The first group contains the term cloud in its name (Cloud, NNClouda), and the second does not have the word cloud (NN-No Name). Regarding big data in the cloud, the following technologies belong to the first type of applications: CloudKit, Cloud Datastore, Light Cloud, Cloudera, and others. The 1010Data System, Algeraix System, Azure Document DB, and Datameer belong to the second type.

From the perspective of logistics and SC, it is acceptable to view cloud services through several functions:

A. Surveillance Security Service (SSS), as: Device-to-Device (D2D), Device-to-Cloud (D2), Device-to-Gateway (D2G), Security-as-a-service (SecuaaS/SaaS), Identity and Policy, Management-as-a-service(IPMaaS), Cybersecurity-as-a-service (CaaS) and/or Crimeware-as-a-service (CaaS).

B. Services of using networks, devices, and sensors with data collection and their processing in a multi-cloud environment, as Infrastructure-as-a-service (IaaS), Things-as-a-service (ThingS), Storage-as-a-service (StaaS/SaaS), PaaS (Platform-as-a-service), Software-as-a-service (SaaS), Sensing-as-a-service (S2aaS), Hardware-as-a-service (HaaS), Sensor-as-a-service (SenaaS), Desktop-as-a-service (DaaS), Network-as-a-service (NaaS), Telematics-as-a-service (TaaS), Quantum as a Service (QaaS), Workspace-as-a-service (WaaS), Ethernet-as-a-service (EaaS), Failure-as-a-service (FaaS), Sensor Event-as-a-service (SEaaS), Application-as-a-service (AaaS) Testing-as-a-Service (TaaS), and Laboratories-as-a-service (LaaS) .

C. Services of unified (joint) communication management of companies with different functions, such as Supply Chain-as-a-service (SCaaS), Logistics-as-a-service (LaaS),

Accounting-as-a-service (AaaS), Object-as-a-service (ObaaS), Mobility-as-a-service (MaaS), Business-Process-as-a-service (BPaaS), Integration-as-a-service (IaaS), Business Integration-as-a-service (BaaS/BIaaS), BI/BIaaS (Business Intelligence-as-a-service), Business Framework-as-a-service (BFaaS), Unified-Communications-as-a-service (UCaaS), Cloud-Based Analytics-as-a-service (CLaaS), Mobility-as-a-service (MaaS and/or MobaaS), Forensics-as-a-service (FEaaS) and/or Digital Forensics-as-a-service (DFaaS), Sensing and Actuation-as-a-

service (SAaaS), Surveillance-as-a-service (VSaaS), Information-as-a-service (IaaS).

D. Database Services, Data-as-a-service (DaaS), Data Integrity-as-a-service (DIaaS), Database-as-a-service (DBaaS/DaaS), Continuous Analytics-as-a-service (CAaaS) Data Mining-as-a-service (DMaaS/DMaaS), Management/Governance-as-a-service (MaaS and GaaS), and Cloud-Based Analytics-as-a-service (CLaaS).

E. Backend as a Service, Backend as a Service (BaaS), Mobile-backend-as-a-service (MbaAS).

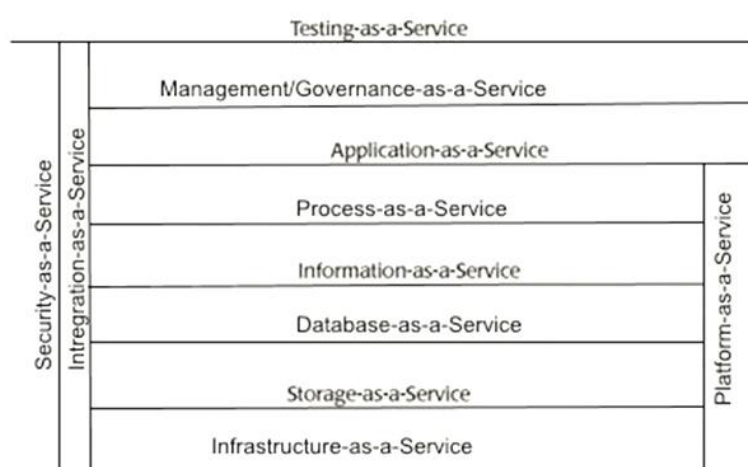


Figure 2. Interdependence of basic cloud technologies

Source: (Linthicum, 2009, pp. 6-11)

From the IT aspect, the development of services on the *Internet base* practically has no capacity limitations (Wang, Lei, & Shang, 2021). Figure 2 shows the characteristics of the basic technologies and their interdependence.

Testing-as-a-service (TaaS) technology enables the collection, updating, and evaluation of data for specific processes or products performed by consultants or service providers, with the fulfillment of objectives set in test objectives.

Management/Governance-as-a-service (MaaS and GaaS), MaaS enables start-up companies to solve specific development problems. GaaS enables the transition from traditional, paper-based government systems to a digital, centralized service delivery model in partnership with industry, citizens, and other stakeholders.

Application-as-a-service (AaaS) enables the use of computer software applications as a remote service on the user's request via the Internet by the ASP as a service provider.

Process-as-a-service, Business-Process-as-a-service (BPaaS) refers to a specific service leased through cloud technologies and a global IP network. It includes combining several service options to fully automate the business process, which helps companies plan for greater efficiency and comprehensiveness in their operations and achieve business goals.

Information-as-a-service (IaaS), information as a service is any combination of the exchange of data and the activities of people who use the obtained information to effectively support operations, management, and decision-making in real-time, according to an entity (customer, product, etc.).

Database-as-a-service (DBaaS/DaaS) is one of the most sought-after cloud services due to the large amount of data from IoT/IloT and other sources. The technology does not require physical hardware setup, software installation, or database configuration, which allows users to scale,

perform, and perform backups and more without their database, reducing overall business costs.

Storage-as-a-service (SaaS/StaaS) is a technology where a company uses public cloud storage or rents another's infrastructure to store data. (Intel, 2023) StaaS can be used to provide storage of blocks, files, folders, and other types of data. It can be based on quantity or a service level agreement.

Infrastructure-as-a-service (IaaS) represents the technology of renting other people's Cloud Data Centers (CDCs) and the complete infrastructure, through CSP. With direct access via the Internet, users are enabled to design and create a physical IT infrastructure in a virtual environment, which can use any application and run it without modifications to the hardware owner's infrastructure, which means that it has full control over all resources, virtual networks, warehouses, vehicles.

Security-as-a-service (SaaS/SECaaS), cyber-security services include cloud and database protection, VoIP security, and general network security. The responsibility for this service belongs to the relationship between CSPs and the Communication Service Customer (CSC).

Integration-as-a-service (IaaS) in B2B relationships requires connecting on-premises data with data residing in cloud-based applications, with which businesses develop, maintain, and manage custom integrations for various cloud systems and applications.

Platform-as-a-service (PaaS) service represents the use of leased platforms located somewhere on a remote server with direct access through a browser. Users do not need to have an operating system and specific tools installed on their local computers, which significantly reduces capital investments. The technology uses Blockchain (Aulbach, 2011, pp. 2-4).

From the aspect of logistics and SC, in addition to the mentioned technologies, the following are significant: Logistics-as-a-service (LaaS), based on integrated business models with a complete logistics service. Supply Chain-as-a-service (SCaaS) is a marketing service that helps to create a campaign for a supplier to customers. Accounting-as-a-service (AaaS) provides accounting services using cloud services.

Mobility-as-a-service (MaaS) technology enables the connection of services by transport and mobility technologies in a package, which ensures adaptability to the needs of end users. Telematics-as-a-service (TaaS) allows companies to pay only for the actual use of the used equipment without the initial investment in telematics equipment. Surveillance and security technologies (D2D, D2C, and D2G) play a significant role in traffic in the exchange of data between vehicles, vehicles and clouds, and vehicles and gateways (Sun, 2014).

The mentioned technologies include a wide range of different standards, such as architecture standards, sensors, communication protocols, application requirements, identification standards, security and data processing standards, standards of various platforms, etc. The importance of standardization is significant because of its advantages. According to Muhonen (2015, pp. 29-38), protocols are crucial. The best examples are Java Message Service (JMS), Message Oriented Middleware (MOM) protocol for sending messages between two or more users, Transport Layer Security (TLS), Secure Sockets Layer (SSL), OSI Model, and many others.

4 CONCLUSION

Managing and mining large amounts of data, especially from sensor systems, pose many challenges to traditional approaches. The cloud computing concept has emerged as the most sought-after destination that promises to effectively solve many problems in the cloud environment by sharing IT resources and services. The paper provides an overview of communication technologies and new services based on the cloud. They are still under development or were created in the last decade. Some significant and applied services are considered according to their applicability in the IoT paradigm. Big data management technologies are observed and are still increasing. Each technology is specific in terms of its software, data storage and processing, and cloud computing mechanism. New ICTs, in IoT/IIoT, lead to numerous advantages in doing business, e.g.:

- providing better services,
- receiving and processing data and information in real time,
- reducing the impact on the environment,

- enabling the application of new approaches and methods with easier real-time management and more efficient use of data,
- making processes visible and realizing the full business integrations,
- increasing safety, security, and business efficiency, etc.

The new vision of ICT is realized by using IoS (Internet of Services). It is achieved by using a network platform that provides support to services and makes it possible to combine different services and providers (ASP, CSP, and ISP). The

essence is in a completely decentralized way of exchanging online services and digital products on P2P networks, which allows programmers to develop large-scale dApps with the possibility of supporting many users, with a series of innovations for specific measurement and interaction between instruments and measurement techniques. Future work needs to expand the discussion on new services and analytics from the point of view of integrating new technologies in different domains based on the hybridization of static and dynamic schemes.

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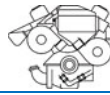
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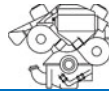
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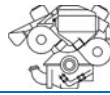


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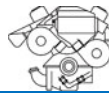
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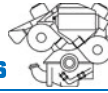
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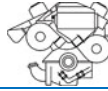
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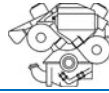
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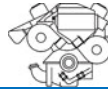
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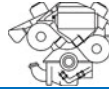
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