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Prof. Drago Cvijanović, Ph.D., University of Kragujevac, Faculty of Hotel Management and Tourism in Vrnjacka Banja, Serbia

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# APPLICATION OF THE AGGLOMERATIVE CLUSTERING PROCEDURE FOR ASSESSING THE CIRCULARITY OF THE EUROPEAN UNION COUNTRIES

Žarko Rađenović[1], Tatjana Boshkov[2]
[1]Research Associate, University of Niš, Innovation Center, Serbia, z_radjenovic89@outlook.com
[2]Professor, Goce Delcev University of Stip, Faculty of tourism and business logistics, R.North Macedonia, e-mail: tatjana.dzaleva@ugd.edu.mk

**Abstract**
The circular economy represents a regenerative concept of the functioning of the economy and society, which aims at a more efficient allocation of resources and their use with the application of the principles of recycling and reducing the rate of waste generation to protect the environment. At the same time, the circular economy transforms and absorbs the existing industrial waste generation to create energy that encourages the further sustainable development of industrial ecosystems by directing processes to improve general business conditions. The primary methodological framework of this research is based on the selection of circular economy indicators and their performance at the level of the European Union for the five years 2017-2021, based on the latest available data from the Eurostat Database. By analyzing the five-year average values of circular economy indicators, using hierarchical cluster analysis using the agglomerative procedure, the European Union members are grouped by similarity into six clusters. Descriptive statistics within a cluster can determine the dominance of a particular cluster and progress in the area of the circular economy. Based on the results obtained, the most significant progress in circular performance was achieved by Croatia, Estonia and Latvia.
**Key words:** *Circular economy, European Union, Cluster analysis, Agglomerative procedure, Indicators*

**JEL Classification: C38, Q57**

## INTRODUCTION

At the macroeconomic level, the circular economy implies the separation of economic growth from the use of natural resources and inputs. Ideally, the rate of resource extraction should remain below the rate of resource consumption, and the rate of waste production should be below the ability of the environment to absorb and transform waste. A circular economy can also be seen as a regenerative system where resource input and waste, emissions, and energy leakage are minimized through long-term design, maintenance, repair, reuse, sharing, remanufacturing, refurbishment, and recycling activities. The traditional model of industrial activity in which individual production processes take raw materials and produce products for sale plus waste to be disposed of should be transformed into a more integrated model ie. an industrial ecosystem. In such a system, the consumption of energy and materials is optimized, the generation of waste is reduced to a minimum, and the effluents of one process serve as raw materials for another process (Vranjanac, Ž. et al., 2023). The circular economy, an inspiring concept that is gaining enormous attention worldwide, deals with the effective scaling of sustainable economic models within planetary boundaries. The principle of extending the life cycle of materials, to keep the value of products and materials as long as possible, is central to this vision, as well as the transition to renewable energy, respect for biodiversity, social balance, and social inclusion. Working on a circular economy means working on the most sustainable development goals, not as a cost item, but as a business model. In some parts of the world, action is taking place within the framework of sustainable development goals, in other countries, climate issues are the dominant driver of action. Some focus on measures that create economically sustainable cities, while there are also regions that have started the transition to a circular economy (Vranjanac, Ž., & Rađenović, Ž., 2022). Innovative

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models based on a closer relationship with customers, mass personalization, the sharing and collaboration economy, and digital technologies such as the Internet, big data, blockchains, and artificial intelligence will accelerate the transition to a circular economy, dematerialization of the economy and the reduction of Europe's dependence on primary raw materials. The circular economy will bring citizens high-quality, functional, and safe products that are efficient and affordable, last longer, and can be reused, repaired, and recycled with high quality. A whole range of new sustainable services, product-as-a-service models, and digital solutions will increase the quality of life of citizens, create innovative jobs, and modernize knowledge and skills.The circular economy has become an attractive and challenging concept in the wide debate on public policy, yet the actual implementation of this concept is still debatable (Ren, Q., & Albrecht, J., 2023). Similar to sustainable development, the circular economy is a fluid concept that is still evolving (Velenturf, A. P., & Purnell, P., 2021).

The concept of the circular economy (CE) has become very popular since it was introduced by policymakers from China and the European Union as a solution that will enable countries, businesses, and consumers to reduce environmental damage and close the loop of the product life cycle (Prieto-Sandoval, V., Jaca, C., & Ormazabal, M., 2018). In a linear economy, natural resources are used to produce new products. Consumers buy products, use them for a while, and then dispose of them. However, as the ecological and economic drawbacks of this system become increasingly apparent, there is a growing need for a new and more sustainable approach (Alberich, J. P. et al., 2023). The central idea of the circular economy concept is to align economic and environmental benefits while reducing dependence on natural resources, achieved through material circulation in the business environment (Geissdoerfer, M. et al., 2020.) In a planned circular cycle, governments centrally guide the transition of the economy, using strong coercive measures such as command and control regulations on production and consumption, introducing taxes, strict limitations, and bans on certain activities (Boonman, H. et al., 2023). Circular consumption places consumers in difficult choices and compromises, while the fundamental technological orientation of the circular economy approach and its ecological modernist idea of gradually adapting the existing production system to the constraints of material resources tend to sideline temporality and spatiality in consumption. According to the principles of the circular economy, energy incineration should be the penultimate option, while landfill disposal should be the last option. In this way, the value chain of products and the life cycle retain the highest possible value and quality for as long as possible, while also being as energy-efficient as possible (Korhonen, J. et al., 2018). When raw material is extracted, refined, and produced at customary costs, it economically and business-wise makes sense for the produced value to be used for as long as possible, to keep the product/service function and utility value in economic circulation for as long as possible. Waste generation is one of the consequences of the traditional linear production process that has been observed in recent decades. The pattern of extraction of primary materials, production, consumption, and disposal, accelerated by economic development, has increased the amount of generated waste (Neves, S. A., & Marques, A. C., 2022). The circular economy (CE) is based on a transdisciplinary discussion aimed at achieving circularity in the management of natural resources. Understanding the cycle of material flow reversal is a potential competitive advantage for businesses, while CE also opens up employment opportunities, developing expertise in legal, mechanical, operational, or cross-sectoral challenges. Circular economy methods are highly scalable, therefore, CE is capable of stimulating growth and attracting investment capital. The circular economy is regenerative by design, in which economic activity builds and restores the overall health of the system (Nunes, A. M. M. et al., 2023) The concept of the circular economy recognizes the importance of an economy that should operate efficiently at all levels, for large and small enterprises, for organizations and individuals, globally and locally.

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## MATERIAL AND METHODS

The methodology applied in this research is mainly based on cluster analysis. The application of cluster analysis aims to group the EU member states based on selected indicators for the circular economy. Grouping the EU member states based on indicator values should contribute to understanding the similarities among countries in specific clusters regarding the implementation of circular economy policies. Additionally, by determining descriptive statistics for each cluster individually, the cluster with the best conditions for implementing the circular economy is identified, guiding for other member countries to progress in this area. In this regard, the authors use the indicator values for the EU27 from the last available five-year period (2017-2021), the Eurostat dataset for CE indicators (Circular Economy), as follows (Figure 1):

- Municipal waste generation per capita (C1) - The indicator measures waste collected on behalf of municipal authorities and disposed of through the waste management system. It largely consists of waste generated by households, although similar waste from sources such as trade, offices, and public institutions may also be included (Eurostat, cei_pc031).
- Packaging waste generation per capita (C2) - "Packaging" in this context refers to all products made from any material of any nature used for containment, protection, handling, delivery, and presentation of goods, from raw materials to processed goods, from producers to users or consumers. 'Single-use' items used for the same purposes will also be considered packaging. "Packaging waste" refers to any packaging or packaging material covered by the waste definition in the Waste Framework Directive 2008/98/EC, excluding production residues (Eurostat, cei_pc040).
- Recycling rate of materials (C3) - The indicator measures the proportion of materials that are recycled and returned to the economy - saving the extraction of primary raw materials - in the total material use. Circular material use, also known as the circularity rate, is defined as the ratio of circular material use (recycling) to total material use (Eurostat, cei_srm030).
- Recycling rate of packaging waste by type of packaging (C4) - The indicator is defined as the proportion of recycled packaging waste in the total generated packaging waste. Packaging waste includes waste material used for containment, protection, handling, delivery, and presentation of goods, from raw materials to processed goods, from producers to users or consumers, excluding production residues (Eurostat, cei_wm020).
- Patents related to waste management and recycling (C5) - The indicator measures the number of patents related to recycling and secondary raw materials (Eurostat, cie_cie020).
- Recycling rate of e-waste (C6) - Waste electrical and electronic equipment, also known as e-waste, such as computers, televisions, refrigerators, and mobile phones, is one of the fastest-growing waste streams in the EU. The indicator is calculated by multiplying the 'collection rate' as stated in the Directive with the 'reuse and recycling rate' established in the Directive (Eurostat, cei_wm050).
- Bio-waste recycling rate (C7) - The indicator is indirectly measured as the ratio of composted/methanized municipal waste (in mass units) to the total population (in number). The ratio is expressed in kg per capita (Eurostat, cei_pc040).
- Municipal waste recycling rate (C8) - The indicator measures the proportion of recycled municipal waste in the total municipal waste production (Eurostat, cei_wm011).

Figure 1. Average indicators values for the EU27 from the last available five-year period (2017-2021)

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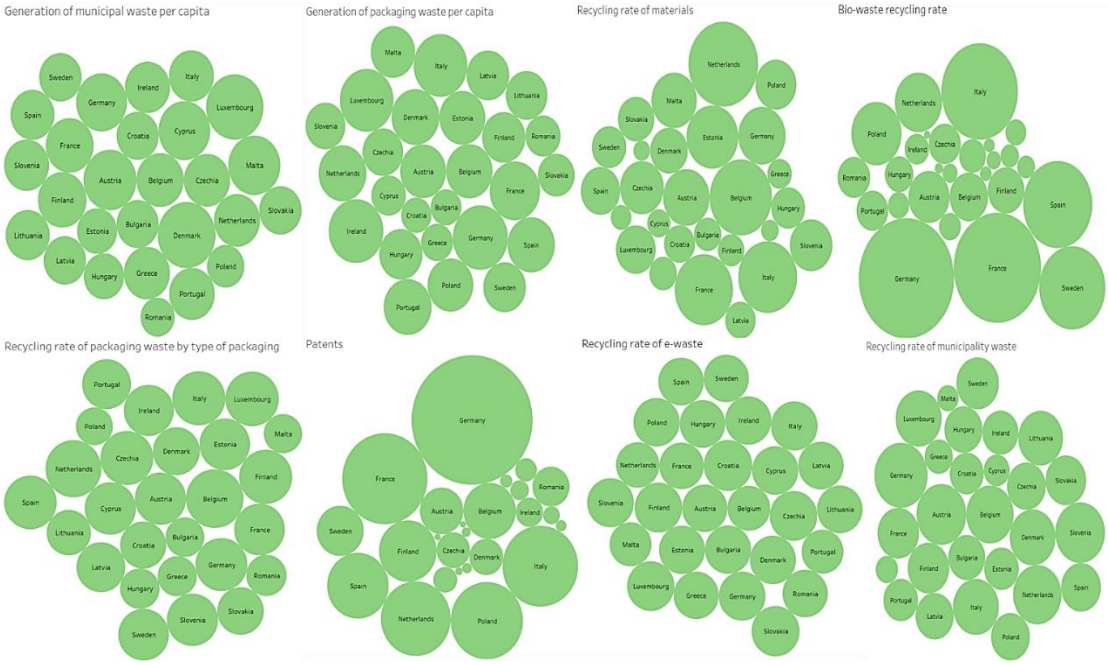


Source: Authors' calculation based on the Eurostat Database

The cluster analysis methodology used in the conducted research is based on a hierarchical agglomeration scheme that, after several iterative steps, shows the last smallest change in the value of the Euclidean distance square, which defines the number of clusters using the proximity matrix. The agglomerative approach first involves a "bottom-up" analysis and then combines objects and groups until each of them is in a group or cluster. The Ward method was applied to form the agglomeration scheme to identify groups of countries that are similar to each other but different from other groups of countries. Specifically, by using this approach, the last significant change in the coefficient of cluster combination determines the total number of clusters (Table 1).

Table 1. Agglomeration schedule coefficients of cluster combination

| Stage | Cluster Combined | | Coefficients | Next Stage |
|---|---|---|---|---|
| | Cluster 1 | Cluster 2 | | |
| **1** | 10 | 26 | .012 | 4 |
| **2** | 11 | 27 | .037 | 5 |
| **3** | 13 | 18 | .075 | 10 |
| **4** | 7 | 10 | .120 | 6 |
| **5** | 9 | 11 | .179 | 6 |
| **6** | 7 | 9 | .245 | 10 |
| **7** | 4 | 16 | .351 | 12 |
| **8** | 2 | 24 | .463 | 15 |
| **9** | 6 | 25 | .582 | 18 |
| **10** | 7 | 13 | .747 | 13 |
| **11** | 1 | 14 | .935 | 19 |
| **12** | 4 | 8 | 1.205 | 22 |
| **13** | 7 | 22 | 1.520 | 15 |
| **14** | 20 | 21 | 1.866 | 20 |
| **15** | 2 | 7 | 2.228 | 19 |

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| | | | | |
|---|---|---|---|---|
| **16** | 3 | 12 | 2.728 | 21 |
| **17** | 15 | 23 | 3.410 | 23 |
| **18** | 6 | 17 | 4.450 | 23 |
| **19** | 1 | 2 | 6.109 | 22 |
| **20** | 5 | 20 | 8.105 | 21 |
| **21** | 3 | 5 | **10.534** | 25 |
| **22** | 1 | 4 | **13.530** | 24 |
| **23** | 6 | 15 | **16.881** | 24 |
| **24** | 1 | 6 | **22.703** | 26 |
| **25** | 3 | 19 | **31.743** | 26 |
| **26** | 1 | 3 | **45.452** | 0 |

Source: Authors' calculation using statistical software IBM SPSS 26.0

The Ward method applied in the agglomerative process is based on the analysis of variance to estimate the distance between clusters and thus differs from others. The Ward procedure means that for each cluster, the average value for each variable (cluster center) is calculated, and then the Euclidean distance square from the cluster center is calculated for each object, after which the distance for the objects is summed (Fanelli, 2018). In this way, cluster analysis attempts to find similarities between the analyzed objects, which in this case are represented in the form of EU member states (Simović et al., 2020). The last significant changes in agglomeration schedule stages are depicted in Figure 2.

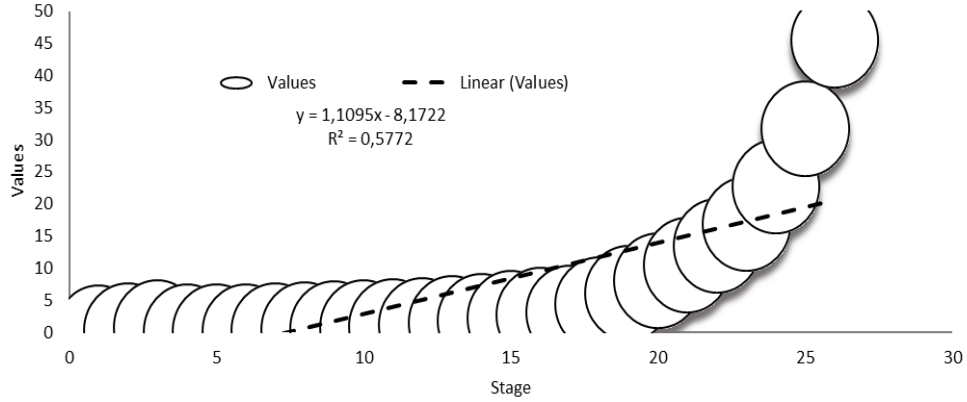


Figure 2. The last six changes in agglomeration schedule
Source: Authors' elaboration based on agglomeration procedure results

The changes that occurred in the agglomeration arrangement after the class recomposition could be followed through a dendogram - the result of cluster analysis in the form of a tree representing the number of clusters on its lower "branches". In this way, it was possible to see how the country moved from one price group of public utility systems to another. The number of horizontal lines at lower tree heights intersected by a vertical line (dashed line) closer to the initial dendogram shows the actual number of clusters. A dendogram divides objects into a certain number of groups in vertical sections at a certain height, with one possible solution for grouping (Figure 3).

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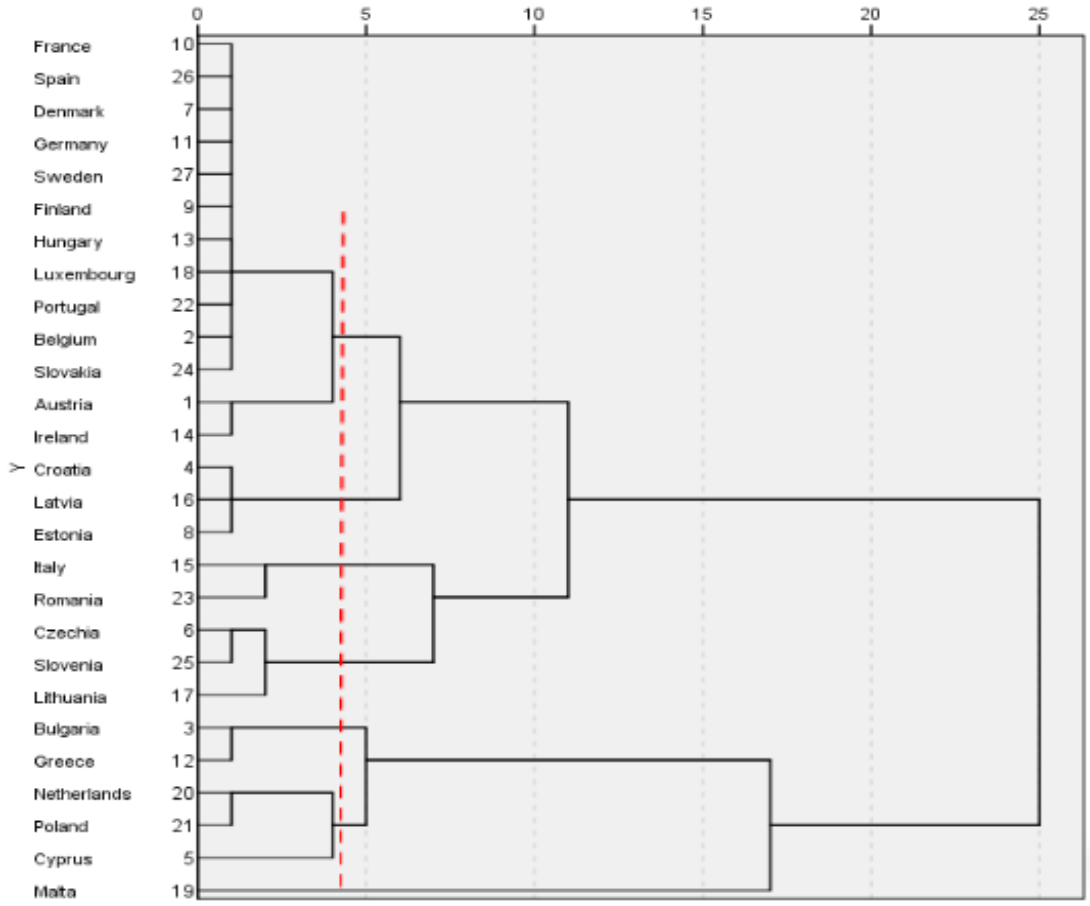


Figure 3. Dendogram using Ward's linkage
Source: Authors' elaboration based on agglomeration procedure results

## RESULTS AND DISCUSSION

The hierarchical agglomerative approach as well as the descriptive statistics between existing clusters show that based on the analyzed indicators of the circular economy, six clusters of countries have been identified. Table 2 shows descriptive statistics for the analyzed indicators with their mean value within each cluster, where it can be seen that cluster number three is dominant in terms of indicators C4, C6, C7, and C8. Cluster number has dominance in recycling rate of materials. On the other hand, cluster number four has the highest results for the circular economy in terms of indicators C1 and C5, while cluster number five has the highest value for the circular economy indicator C2.

Table 2. Descriptive statistics for the indicators within six analyzed clusters

| Cluster | N | Mean | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 |
| 1 | 13 | 2.987 | 2.994 | 3.785 | 3.725 | 2.938 | 3.047 | 3.051 | 2.934 |
| 2 | 5 | 2.714 | 2.542 | **3.832** | 2.496 | 2.168 | 3.024 | 2.693 | 2.785 |
| 3 | 3 | 3.031 | 3.046 | 3.766 | **3.884** | 1.899 | **3.283** | **3.168** | **3.161** |
| 4 | 3 | **3.048** | 3.050 | 3.779 | 3.680 | **4.239** | 2.961 | 3.016 | 3.041 |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5 | 2 | 2.778 | **3.143** | 3.723 | 3.569 | 3.147 | 1.797 | 2.79 | 2.727 |
| 6 | 1 | 2.958 | 2.99 | 4.059 | 3.82 | 1.000 | 2.751 | 0.001 | 3.085 |

*C1- Municipal waste generation per capita, C2- Packaging waste generation per capita, C3- Recycling rate of materials, C4- Recycling rate of packaging waste by type of packaging, C5- Patents related to waste management and recycling, C6- Recycling rate of e-waste, C7- Bio-waste recycling rate, C8- Municipal waste recycling rate
**N- number of analyzed countries in the particular cluster
Source: Authors' calculation using statistical software IBM SPSS 26.0

Based on the mentioned descriptive statistics and membership in specific clusters, where the first cluster consists of thirteen countries, the second cluster contains five member states, the third and fourth clusters have three countries each, the fifth cluster consists of two countries, and the sixth cluster comprises a single-country cluster (Malta), a map of circular economy clusters based on circular business model indicators for EU27 was created (Figure 4). These clusters consist of the following countries:

- Cluster 1: Austria, Belgium, Denmark, Finland, France, Germany, Hungary, Ireland, Luxembourg, Portugal, Slovenia, Spain, and Sweden.
- Cluster 2: Bulgaria, Cyprus, Greece, Netherlands, and Poland.
- Cluster 3: Croatia, Estonia, and Latvia.
- Cluster 4: Czech Republic, Lithuania, and Slovakia.
- Cluster 5: Italy and Romania.
- Cluster 6: Malta.

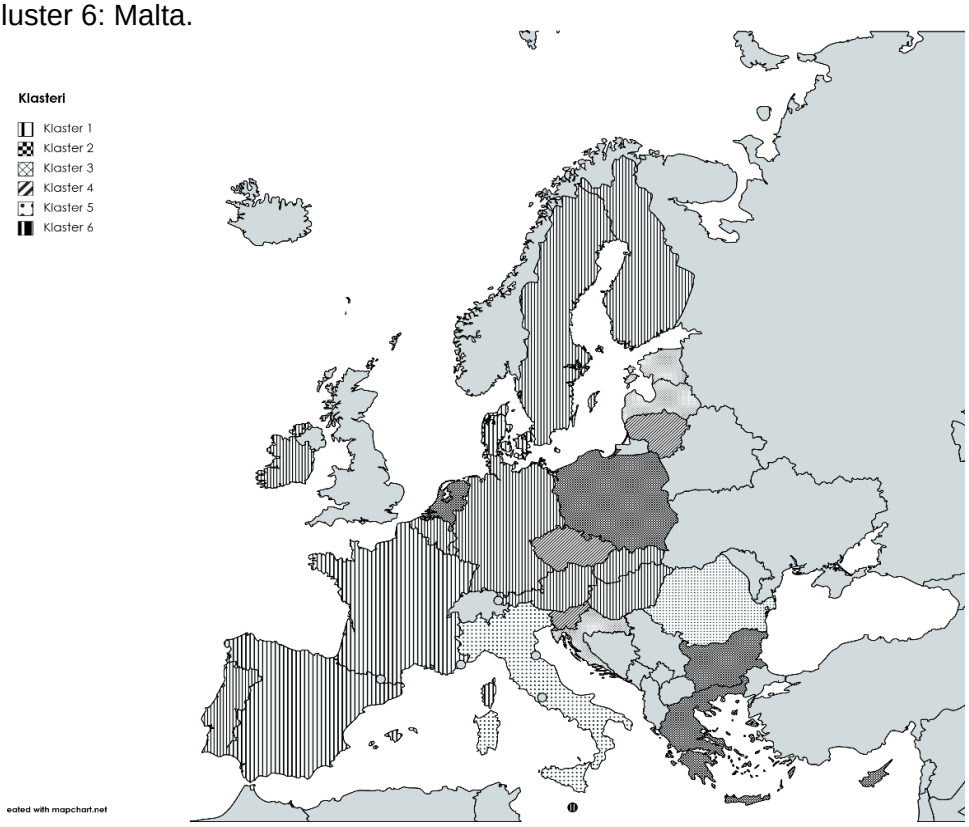


Figure 4. EU27 map chart based on cluster membership and descriptive statistics among clusters
Source: Author's calculation using statistical software IBM SPSS 26.0

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To validate the hierarchical grouping, the authors used Levene's statistic. The Levene test is one of the most commonly used tests, which starts from the null hypothesis that the variance is the same in all samples if $P > 0.05$. If $P > 0.05$, the null hypothesis is accepted, and the alternative is rejected, implying that the variance is equal for at least one pair of samples (Rađenović et al., 2022). Testing showed that statistically significant differences do not exist between the variations of the given sample, as recorded in Table 3. The results further indicate that the null hypothesis was accepted, meaning that the variance is homogeneous for the given variable across groups.

Table 3. Levene statistics and ANOVA procedure

| Indicators | Levene Statistic | Sig. | Decision | Mean Square | Sig. | Decision |
|---|---|---|---|---|---|---|
| C1 | 4.463 | .090 | Approved | .079 | .038 | Approved |
| C2 | .736 | .578 | Approved | .197 | .000 | Approved |
| C3 | .659 | .628 | Approved | .018 | .013 | Approved |
| C4 | 11.671 | .050 | Approved | 1.271 | .000 | Approved |
| C5 | 3.429 | .056 | Approved | 2.869 | .000 | Approved |
| C6 | 1.436 | .257 | Approved | .636 | .000 | Approved |
| C7 | 2.974 | .053 | Approved | 1.832 | .000 | Approved |
| C8 | 1.245 | .322 | Approved | .081 | .037 | Approved |

*The level of significance is taken at 0.05.
Source: Author's calculation using statistical software IBM SPSS 26.0

The authors used ANOVA procedure to examine the statistical significance of differences in average indicator values among clusters. Based on the conducted ANOVA procedure (Table 3), statistically significant differences in average indicator values can be noted, as seen in the Sig. column where $P < 0.05$ for all CE indicators.

## CONCLUDING REMARKS

The cluster comprising of Croatia, Estonia, and Latvia exhibits the best performance in the area of circular economy for indicators like the recycling rate of packaging waste by type of packaging, patents related to waste management and recycling, the recycling rate of e-waste, the recycling rate of bio-waste, and the recycling rate of municipal waste, as can be clearly seen from the results of the mean values of the indicators among the clusters. Specifically, four growth directions are defined under the Croatian National growth Strategy 2030 (NDS 2030): balanced regional development, green and digital transformation, enhancing crisis resilience, and sustainable economy and society. In this sense, by guaranteeing a just and inclusive transition to climate neutrality, Croatia will be among the leaders in Europe in transforming environmental and climate-related issues into possibilities. A defined circular economy strategy and action plan have been established by Latvia for the 2020–2027 transition period. The Action Plan's main goal is to offer a framework for policymaking that will enable the nation to move towards a more environmentally friendly economy and help realise the Sustainable Development Goals (SDGs) and the European Green Deal. It is intended to make sure that the CE is applied wisely in Latvia's economy and society, to encourage more deliberate, accountable, and sustainable resource production and consumption, and to incorporate these fundamental ideas into all sectoral policies concerning resource flows and lifecycle stages. In terms of the EU Circular Economy Monitoring Framework metrics, Estonia has made inconsistent progress thus far, with no notable shifts in recent times. Positive developments include increasing the usage of circular materials and decreasing trash

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creation. However, increasing recycling rates continues to present challenges. The primary obstacles Estonia has in advancing a circular economy include poor environmental consciousness and societal knowledge of the CE, a lack of collaboration across stakeholders, and the diluting of duties. The creation of garbage has grown in Malta (country-cluster) due to significant increases in tourism, GDP, and overall population between 2010 and 2020. Malta's industrial sector depends heavily on imported goods for both raw materials and finished goods. Italy and Romania have the highest packaging waste generation per capita according to cluster descriptive statistics which is conversely expanding of their circular rate. To enhance circular economy practices, stakeholders should collaborate on aligning national strategies with EU directives. Investments in research and innovation are most important for developing circular solutions and waste management infrastructure. Promoting circular design principles and product lifecycle assessments can drive sustainable production. Capacity-building programs should equip stakeholders with the skills needed for a circular transition. Monitoring frameworks must be established to track progress and assess the effectiveness of circular initiatives. These measures vary between countries and clusters, highlighting the need to dynamically seek optimal solutions for enhancing circularity in today's and future's evolving conditions.

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# DIGITAL NOMADS AS CONTEMPORARY FORM OF BUSINESS TOURISM

**Oliver Filiposki[1], Dejan Metodijeski[2], Nikola Cuclevski[3]**

*[1]Associate professor Faculty of Tourism and Business Logistics, Goce Delcev University, Stip, North Macedonia; e-mail:* oliver.filiposki@ugd.edu.mk
*[2]Professor, Faculty of Tourism and Business Logistics, Goce Delcev University, Stip, North Macedonia,* dejan.metodijeski@ugd.edu.mk
*[3]Associate professor, Faculty of Tourism and Business Logistics, Goce Delcev University, Stip, North Macedonia, e-mail:* nikola.cuculevski@ugd.edu.mk

**Abstract**

Business tourism is a term used to describe all travel that results directly from work duties or indirectly in the performance of work-related activities. This includes activities related to daily work duties, but also travel for corporate or organizational meetings, conventions and congresses. Digital nomad is a term used to describe people who use telecommunication technologies in their work and live a nomadic life. Digital nomads work from different countries, in different spatial conditions such as cafes, libraries, recreational vehicles, etc. The subject of this paper is the digital nomads as contemporary form of business tourism. The paper presents review of research concerning digital nomads and business tourism. For the purpose of the paper, a research methodology and secondary data sources have been used by consulting literature, studies, statistical data and official web pages of institutions concerning digital nomads and business travel. An analysis and review of different types of nomads and destinations offering digital nomad visa in selected Mediterranean countries has been made, based on a systematic evaluation of the current content of relevant literature using methodology of content analysis.

**Key words:** *travel, work, visa, MICE, freelancer.*

**JEL Classification: L83**

## INTRODUCTION

Business tourism includes people who travel to a certain destination for business (professional) reasons (Jovanović, 2022). According to data from the World Tourism Organization, in 2019 the number of tourists at the international level was 1,460 million, of which 11% were business trips (about 150 million tourists) (UNWTO, 2021). A large part of business tourism is related to the organization of events and is called MICE tourism (Mai, 2014). MICE is an acronym for Meetings; Incentives; Conferences and Exhibitions (Papathanassis, 2011). It is a term often used in the travel industry when it comes to business travel. The historical development of business tourism is directly related to the development of international tourism. Throughout history we have numerous evidence and archaeological discoveries of trade travel. The world's great geographical discoveries are based on the search for alternative trade routes. Business trips are also found in ancient civilizations. Between the 3rd and 4th centuries Rome was a city that was a popular destination in the summer and attracted many tourists. Visitors came to the city to relax in the baths, play games of chance, and visit the Colosseum where they would attend gladiator fights, visit restaurants and try local specialties, see a musical performance or a marketplace where they could buy slaves from Africa (Walton, 2005). Also, tourists visited Rome to admire the grandiose and imposing buildings, monuments, palaces, forums, etc. On the other hand, for the same reasons, the Romans visited the cities of Greece, Egypt and other developed countries at that time. We will mention the Silk Road and the Industrial Revolution as significant historical moments in the development of business tourism. Due to its nature and characteristics,

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business tourism is more prone to changes in national and international economic conditions, and it stagnates during world economic recession and crises (Jafari & Xiao, 2016).

Business tourism is a term used to describe all trips that result directly from work duties or indirectly when performing work-related activities (Методијески & Голаков, 2013). This includes activities related to daily work duties, but also travel for corporate or organizational meetings, conventions and congresses. Incentive tours that companies use to reward their best employees also fall into this group. Business travel, by its very nature, can involve last-minute bookings, frequent travel changes and cancellations. Since the costs are generally covered by the company or organization, price plays a big role. This does not imply that companies are not interested in managing their travel costs. Companies, government institutions and other types of organizations are taking ever greater steps in cost control through official reports and through negotiations to obtain the most favorable offers from airlines and hotel chains. Business travel is different from pleasure travel for several reasons. Their preferred destination is generally cities, not famous destinations. For that reason, regions with well-developed industrial or service economies attract the largest share of business travel. Such journeys are less seasonal and more concentrated in the middle of the week where transport is used in the morning before and in the evening after working hours. Consequently, the hotels that accommodate these tourists are faced with the challenge of how to fill the facility during the weekends. Due to their professional status, business tourists are generally highly educated and wealthy. These characteristics make them desirable by the offer that encourages them to take a vacation in the destination for a few days before or after meetings or conferences. People traveling for business may decide to bring their partners with them or return to the same place for vacation at another time. Business tourism is a significant factor for many cities. In Brussels, for example, where the seat of the European Union is located, 74% of overnight stays are made by business tourists (Swarbrooke & Horner, 2001).

The State Statistics Office defines business trips in the following way (ДСЗ, 2017): A business trip is any trip outside the place of permanent residence for business purposes, at the expense of the employer (enterprise or other organization) or at one's own expense (private individuals), during which at least one night was spent in a catering or similar accommodation facility (including overnights in sleeping cars and couchette cars) in the country or abroad. Business trips include traveling to business meetings, seminars, congresses, etc. Working on construction sites and other facilities outside the place of permanent residence, for which the employee receives a special field allowance from his organization, is not considered a business trip. More so, traveling of our citizens abroad is not considered as an official trip if the expenses for those trips are met by the foreign country.

Table 1 presents the structure of business tourism, that is, the three significant segments of the tourist market from the aspect of business tourism: demand, mediation and supply (Методијески et al., 2022).

Table 1. Structure of business tourism

| | |
|---|---|
| Demand | Individual clientele<br>Companies<br>Associations |
| Intermediaries | Travel agencies for business trips<br>Event management companies<br>Fair and conference organizations<br>Destination Management Bodies<br>Travel agencies for incentive arrangements |
| Offer | Transport companies<br>Fair and conference organizations<br>Facilities for event organization<br>Accommodation facilities<br>Food and beverage facilities |

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Business tourism achieves more positive impacts in the development of tourist destinations such as:

- Business tourists visit the destination out of season, not during school holidays or public holidays.
- Business tourists generate a relatively high cost daily (higher than the average consumption of classic tourists).
- Business tourists behave well and create less problems for the local community.
- Business tourists create more employment opportunities for the local population and use different services such as photos, printing services, dry cleaning, florists, etc.
- Destinations increase the visibility of leisure facilities among the local population, such as shops, cinemas, theaters, etc., because they are also used by business tourists.
- Destinations justify investments in their local infrastructure, because it is also used by business tourists.

In terms of destinations, business tourism has the following characteristics (Rabotić, 2013):

- Quality and profitability. In business tourism the basic rule is to use services of high category hotels as well as catering and other various services (car rental, shopping, sports and recreation, wellness, etc.), air transportation using regular lines, individual transfers, diverse on-site content (culture, art, etc.) with professional organizers, such trips also generate higher revenues resulting in higher tax benefits; Business tourists are more inclined to increased personal consumption, since their basic expenses (travel and accommodation) are covered by the companies, i.e. the employers.
- Sustainability. Business tourism has the characteristics of sustainable tourism, overall it is mainly realized outside the peak season, which means that the accommodation and other facilities continue with operations and employment due to the fact that their total occupancy increased. As a result of the modern needs and demands of customers, tourist facilities are included in various programs of energy conservation, waste recycling, water consumption, etc.
- Catalyst for the resuscitation of the local community. Business tourism encourages new investments, whether it is for the improvement of existing infrastructure or the construction of new facilities (congress centers, hotels, marinas, sports and recreational facilities, etc.), in previously unattractive locations. Therefore, certain peripheral zones in cities are successfully revitalized hence the new contents are being introduced and used by the local population.
- Promotion of the destination. Business travelers could become acquainted with the local tourist and other attractions of the destination. Large business gatherings are supported by destinations and tourism organizations, seeing that it is an opportunity to directly present their offer to potential future tourists (brochures, cocktail presentations, etc.).

According to the research of the International Association for Congresses and Conventions, the following results related to the organization of events from the aspect of business tourism can be observed worldwide (International Congress and Convention Association, 2019): in 2019, 13,254 international meetings were organized, and the most common period of these events are held in the months of June, September and October.

Table 2. Top 10 countries and cities according to the number of held international meetings (2019)

| Country | Meetings | City | Meetings |
|---|---|---|---|
| USA | 934 | Paris | 237 |
| Germany | 714 | Lisbon | 190 |
| France | 595 | Berlin | 176 |
| Spain | 578 | Barcelona | 156 |
| England | 567 | Madrid | 154 |

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| | | | |
|---|---|---|---|
| Italy | 550 | Vienna | 149 |
| China | 539 | Singapore | 148 |
| Japan | 527 | London | 143 |
| Netherlands | 356 | Prague | 138 |
| Portugal | 342 | Tokyo | 131 |

In the top 10 countries according to the number of held international meetings in 2019, 7 countries are from Europe, 2 from Asia and the USA which are in first place according to the number of held meetings. It is interesting that in the top 10 cities according to the number of held international meetings, no cities from the USA are represented. Among the cities in the top 10, European capitals prevail, Paris is in first place according to held meetings, and two of the 10 cities are in Asia (Tokyo and Singapore). In the relevant world literature related to business tourism, based on different criteria, the following types of business tourism have been determined (Swarbrooke & Horner, 2001):

- Traveling daily outside his permanent place of residence.
- Local, regional and national meetings and conferences (associations and business entities).
- International congresses.
- Training courses.
- Fairs.
- Introduction of new products on the market.
- Incentive trips.
- Short-term migration due to work.
- Volunteering.
- Mobility of students and academic staff.
- Delivery of goods and services to customers and markets.
- Military service outside the permanent place of residence.
- Non-governmental organizations that operate projects outside the territory where they are registered.
- Civil servants traveling for work, diplomats, etc.
- Individual business trips.

The development of different types of business tourism is stimulated by various factors which are presented in table 3.

Table 3. Factors that stimulate the development of different types of business tourism

| Type of business tourism | Factors |
|---|---|
| Incentive Arrangements | Introduction of human resource management theories and practices based on stimulating work performance by offering non-monetary rewards to recognize the contribution of key individuals. |
| Training | The growth of new technologies that require personnel to be trained or retrained.<br>Emphasis on quality and service for which training is carried out. |
| Introducing new products | The growing globalization of the markets and the need to place products in more countries.<br>Growth of competition and need to introduce new products to raise awareness of new products in the market in a very quick time. |
| Education | Growth of transnational cooperation in education.<br>Increasing student exchange.<br>Growth in field visits in all levels of education. |

There are several characteristics that separate individual business travel from business tourism. With individual business trips, there is no choice of destination (the work

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dictates the choice), the trips are regular and necessary, i.e. related to work, the trips are frequent and mostly individual. In business tourism, there is a flexible choice of destination, they come occasionally as a reward, etc., and group trips are frequent. Business tourism related to events includes a variety of events such as: conferences, conventions and meetings, product marketing, fairs, company celebrations, anniversaries, etc. The World Tourism Organization defines meetings as the gathering of 10 or more persons for a minimum period of 4 hours in a suitable meeting facility (UNWTO, 2014). Business trips may vary according to the time available to tourists. On some trips, business travelers do not have free time for tourism activities, while on many other trips they have a few hours of free time or a day off after work (Leiper et al., 2008). The most significant characteristics of business tourists are the following (Association of Corporate Travel Executives, 2016): increased concern for work-life balance; combine travel with rest; increased concern for environmental protection; increasing trips where they are accompanied by a family member; increased number of days off due to business trips; share transportation and accommodation services with colleagues; increased concern for security, etc. Worldwide, many destinations at the local, regional and national level promote and make efforts to attract business tourists and position the destination on the global map of business tourism. Primarily, business tourism is promoted through national tourism organizations and convention bureaus, as well as individually by convention centers and event management companies.

## MATERIAL AND METHODS

### Defining digital nomads

Digital nomad is a term used to describe people who use telecommunication technologies at work and live a nomadic life. These people work from different countries, in different space conditions such as cafes, libraries, recreational vehicles, etc. The term derives from the words digital and nomad. The term digital implies working with the touch of the fingers, with buttons and using computers, the Internet and digital tools. A nomad is a person who does not have a permanent place of residence or often changes his residence.

The concept of "teleworking" is broad, and at its core is the idea of a worker providing services while not physically present at the office or premises of his employer and where such distance is not a necessary function of his work tasks (as opposed to a worker who helps the client out of the office or temporarily attends an event or forum). Telecommuting focuses on three types of workers: In-country telecommuter; Hybrid Worker; Digital nomad (Business Advisory Group on Migration, 2024).

Table 4. Working remotely

| Type of remote worker | Place of work and residence |
|---|---|
| In-country telecommuter | - Lives in the same country as his employer.<br>- He never (or rarely) works in an office. |
| Hybrid worker | - Lives in the same country as his employer.<br>- He divides his time between working in the office and working remotely, mostly from home. |
| Digital Nomad | - Lives in a different country from his employer and most often in another country outside his home country.<br>- Works exclusively remotely. |

Digital nomads differ from permanently employed individuals who work from home or work remotely (remote work). Working from home is a way of working in which the worker fulfills the basic tasks of his job while staying at home with the help of information and communication technology (ICT). ICT advances in some sectors have enabled alternative ways of working, including work from home, teleworking, telecommuting and remote work. The remote work can include different locations outside the primary workplace or the employer's premises such as mobile work (Бизнис конфедерација на Македонија, 2020). Digital nomads in their work often use wireless internet, smartphones, internet telephony and

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cloud computing applications to work remotely from where they live or travel. Digital nomads continue to work with clients and their employers during their travels or extended stays abroad. A digital nomad is a type of work and lifestyle that creates certain problems such as maintaining international health and pension insurance on a global level, complying with different local laws in the destinations where you stay, obtaining a work visa, tax obligations and maintaining connections with friends and family. Other problems that arise with this type of work and life are the differences in time zones, the difficulties in finding safe and fast internet, as well as the absence of sick days and longer holidays because digital nomads do not have a permanent and reliable source of income, and in some countries, the legislation does not treat freelancing (freelancer) as employment, but as free provision of services with special rules and rates for taxation. The term freelancing means freelance or non-permanent work, so the person who deals with this work is a freelancer, that is, he works as a freelancer with a contract for a company but is not an employee of that company. Most often freelancers are people who do not have their own company and function as natural persons, and usually freelancers are marketing managers, project managers, podcasters and YouTubers, tiktokers, bloggers, designers, video and audio production, architects, programmers, journalists, translators, tutors, artists, craftsmen, photographers, etc. Among the main advantages of being a freelancer are the following:

- The freelancer is his own boss – this means that he himself determines the working hours and the place where he will work. He could choose for whom and with whom he will work.
- The freelancer does not need big investments – sometimes, to work, the freelancer needs a laptop, internet connection, software for work. There is no need to invest in expensive equipment, a business facility and additional activities that would incur additional costs.
- The freelancer has more time for private life – because they mostly work from home, they don't have expenses for daily travel from home to work and vice versa.

In recent years, influencership has become more and more popular. An influencer is a person who has influence; that inspires or directs the actions of others; which can generate interest in something (like an ad for a consumer product) by promoting it on social media. Influencers are respected, seen and heard in a specific industry by a large audience (Hudders et al., 2020). They are categorized by their ability to influence the opinions of their listeners. Influencers are people who have gained fame thanks to their interest, knowledge or skills in a certain field and who, through frequent postings on social networks, create a wide circle of followers. On social media, influencers can help get a product, post or event well received by a large audience. In the last few years, together with the development of technologies and due to the COVID-19 pandemic, which mainly resulted in the digitization of many functions and jobs, the number of digital nomads is increasing (Orel, 2021). The term "digital nomad" was introduced at the end of XX to describe the vision of technological progress for human life and work (Makimoto & Manners, 1997). A digital nomad can be defined as a fully mobile/mobile worker (usually an intellectual) who uses digital technologies that allow him to work at any time and from any place in the world (Liegl, 2014). The lifestyle of the digital nomad is also characterized by a commitment to travel. Therefore, it is emphasized that it is not only the form of work, but also the way it is organized and the general understanding of the way of life. In this context, a distinction should be made between the term "digital nomad", which means a mobile worker who performs work tasks from any and a voluntarily chosen location in the world with the support of digital technology; and "digital nomadism" meaning the lifestyle these mobile workers lead and develop (Hanonen, 2020).

**Methodology**

The subject of this paper is the digital nomads as contemporary form of business tourism. The paper presents review of research concerning digital nomads and business

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tourism. For the purpose of the paper, a research methodology and secondary data sources have been used by consulting literature, studies, statistical data and official web pages of institutions concerning digital nomads and business travel. An analysis and review of different types of nomads and destinations offering digital nomad visa in selected Mediterranean countries has been made, based on a systematic evaluation of the current content of relevant literature using methodology of content analysis (Ritchie et al., 2005).

## RESULTS AND DISCUSSION

### Types of nomads

The digital nomad lifestyle is one of the fastest growing and most popular social trends. Currently, it is estimated that the number of digital nomads in the world is from 40 to 80 million. During the next ten years, the estimated number of nomads in the world will increase continuously (Sztuk, 2023). Digital nomads differ from home-based workers in that digital nomads have a desire to gain new experiences while traveling abroad. On the other hand, the main issue that distinguishes the digital nomad from the traditional tourist is that tourists usually travel as part of their vacation without the need to perform official duties during their stay. In addition, a significant proportion of tourists are often unaware of the social situation in the destination they are staying in. Most tourists also avoid direct integration and contact with local communities, which could potentially present a place's identity to a much wider extent and show its unique characteristics (Thompson, 2019). Digital nomads are more involved in exploring destinations and local culture than traditional tourists. They engage in slow tourism to a much greater extent than traditional tourists during their stay in the destination. The distinction between full-time telecommuters and digital nomads should also be emphasized. The mobility of nomads motivates the search for new experiences, adventures, meaning and discoveries rather than economic or political factors related to the work performed (Benson & O'Reilly, 2009).

Table 5. Types of nomads

| Types of nomads | Characteristics |
|---|---|
| Digital nomads | - new destinations<br>- move constantly<br>- work in places that have good access to the Internet on weekdays<br>- related to technology<br>- building startups<br>- free time on weekends |
| Spiritual Nomads | - spiritual Goals<br>- meaning and inspiration<br>- communicate and share their spiritual ideas |
| Quick Time Nomads | - employees who are allowed to travel frequently<br>- they travel quite intensively<br>- high price |
| Corporate nomads | - work in large companies<br>- work does not require physical presence (remote workers)<br>- work from home or from other places (with the status of regularly employed persons) |
| Half-half nomads | - a balanced activity between work time and free time during the trip<br>- seasonal employees (specific season/specific destination)<br>- once their contract is over, they can take full vacation |
| Offline/Classic Nomads | - classic nomad type<br>- skills such as street performers, English teachers, chefs and diving instructors |

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| | |
|---|---|
| | - destinations with a low salary, according to the local salary<br>- become part of the local community |
| Volunteers/ Domestic nomads | - no money exchange in this nomad model<br>- a traveler visiting a place as a volunteer (free accommodation and food) |
| Wealthy nomads | - free and flexible in their travels<br>- wealth and prosperity<br>- have acquired financial means through a lottery, through inheritance or through a successful career |
| Retired Nomads | - travel nomadically<br>- seek a nomadic lifestyle<br>- realizing the dream after completing their family obligations<br>- the pension is their only income for travel |
| Homemade nomads | - spend a significant life without travel<br>- find adventure and attractions in their local community |

In the existing literature, there are several different divisions of the types of nomads, and for the purposes of this paper we will stick to the classification of 10 types of nomads (Poulaki et al., 2023).

**Visa for digital nomads**

Visa is an official document issued by the appropriate authorities that allows a foreign citizen to enter, stay or leave the territory of a certain country. As the number of digital nomads is expected to grow steadily in the coming years, many countries around the world have started competing with creative policies to attract digital nomads. Hence the emergence of the so-called "digital nomad visa", which is a special category of visa, residence and work authorization outside the standard procedures that a foreigner has to fulfill. In this case, we are not talking about a visa in the classic sense, but about a residence permit for professionals who will be able to live temporarily in a certain country, while continuing their work remotely. At the same time, certain tax reliefs and exemptions are provided for them.

Table 6. Visa for digital nomads in selected Mediterranean countries (Poulaki et al., 2023).

| Visa Information | Spain | Portugal | Croatia | Italy | Greece |
|---|---|---|---|---|---|
| Digital Nomad Visa | Yes | Yes | Yes | Yes | Yes |
| Visa costs in euros | 80 | 75-90 | 80-130 | To be determined additionally | 75-150 |
| Duration | 1 year | 4 months to 1 year | 1 year | 1year | 1year |
| Minimum stay | At least 6 months | None | None | None | At least 6 months |
| Possibility of extension | Up to 5 years | Up to 5 years | New application | To be determined additionally | Up to 2 years |
| Minimum income | 2332 | 3040 | 2539 | To be determined additionally | 3500 |
| Visa issuance time | 20 working days | 3-4 months | 3-4 months | To be determined additionally | 30 working days |

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| Visa for family members | For wife and children | For wife and children | Increase 10% of minimum income for each family member | To be determined additionally | For wife and children |

The economic logic of these visas is that digital nomads will spend a large part of the funds they earn during their stay in the destinations, they will enter the local economy, and at the same time they will bring with them to the destination skills and knowledge that can be applied in the local startup eco-system. We will explain this with several examples:

- Mexico City authorities estimated that digital nomads (remote workers, mostly from the US) contribute 523.4 million US dollars to the city's economy (Alfaro, 2023);
- Government officials from Madeira, Portugal estimated that the average digital nomad spends $2,100 per month in the local economy (The Economist, 2021);
- In Barbados, the authorities annually generate 6 million US dollars from visa fees for digital nomads and 100 million dollars in income from this type of tourism (OECD, 2022).

Worldwide, the largest number of digital nomads come from the United States. Although there is no centralized database for the destinations where digital nomads stay (more than 50 countries), several specialized websites for digital nomads point out that a dozen countries stand out according to the conditions they offer, but also other advantages such as a favorable climate, relatively the low cost of living compared to IT hubs like San Francisco and Silicon Valley. It is estimated that the most popular destination for digital nomads in terms of numbers is Mexico, and this is primarily due to the large number of Americans who temporarily live in the southern neighbor due to the lower costs of accommodation and living, as well as the availability of attractive tourist spots. Among the European destinations, Lisbon in Portugal, Tallinn in Estonia, Budapest (Hungary), Prague (Czech Republic), the coast and larger cities in Croatia, tourist cities in Greece, Spain and Italy stand out. Recently, the Serbian capital Belgrade with its benefits for IT experts from abroad, Tbilisi in Georgia with its low taxes intended for digital nomads and Malta's openness to foreigners including digital nomads and the simple path to citizenship through entrepreneurial investments have received excellent marks. The authorities in the Republic of North Macedonia announce the introduction of a special "visa for digital nomads", but this reform is still in its initial phase.

Some of the Caribbean countries, as well as some countries in South America (Argentina and Colombia) appear as an attractive destination for digital nomads. Dubai (UAE) offers the possibility of a one-year stay for people who work for a foreign employer or independently, and the presence of numerous entrepreneurs and investors in this destination is a positive aspect. In Asia, countries such as Indonesia, Thailand, Malaysia, South Korea and Vietnam are listed best.

## CONCLUDING REMARKS

Business tourism is a term used to describe all travel that results directly from work duties or indirectly in the performance of work-related activities. This includes activities related to daily work duties, but also travel for corporate or organizational meetings, conventions and congresses. A digital nomad is a term used to describe people who use telecommunications technologies at work and live a nomadic life. Digital nomads work from different countries, in different spatial conditions such as cafes, libraries, recreational vehicles, etc. Research for the purposes of this paper shows that there are different types of nomads, and the following 10 types have been identified in the relevant literature: Digital nomads, Spiritual nomads, Fast-time nomads, corporate nomads, Half-half nomads, Offline / Classic nomads, Volunteers / Domestic Nomads, Wealthy Nomads, Retired Nomads and Domestic Nomads. As the number of digital nomads is expected to grow steadily in the coming years, many countries around the world have started competing with creative policies to attract digital nomads. Hence the

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emergence of the so-called "digital nomad visa", which is a special category of visa, residence and work authorization outside the standard procedures that a foreigner has to fulfill. For the needs of this thesis, a tabular review was made that shows possibilities and procedures for obtaining a visa for digital nomads in selected Mediterranean countries such as Spain, Portugal, Croatia, Italy and Greece. The economic logic in issuing these visas is that digital nomads will spend a large part of the funds they earn during their stay in the destinations, they will contribute to the local economy, and at the same time they will bring with them skills and knowledge that can be applied in the local startup eco-system of the destination.

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# TOURIST PLACES, FACILITIES AND EVENTS THAT MACEDONIANS SHOULD VISIT

**Nikola V. Dimitrov**[1]
*PhD, University "Goce Delchev" - Stip, Faculty of Tourism and Business Logistics*
*nikola.dimitrov.ugd.edu.mk*

## Abstract

Identity is a trait, a property, a sense of something that exists and that stands out and differs from others. Macedonian identity is a unique feature of an ancient nation with its own language that existed and still exists on the territory of Macedonia.

The uniqueness of the Macedonian identity is a multi-millennium mosaic layered and supported by a diverse natural and cultural heritage.

The aim of the paper is to strengthen the Macedonian patriotic identity through tourism by identifying tourist places, facilities and events that Macedonians should visit to confirm their continued existence at home, in the immediate neighborhood and beyond to promote cosmopolitanism. Whether Macedonians will make the visit with a physical presence individually or organized through travel agencies, or virtually using the Internet - modern technology for education, is a personal decision of every Macedonian.

The material in the paper is divided into three parts. The first part mentions tourist places, facilities and events in the area of RS Macedonia. We are talking about locations that reflect the continuity of Macedonia and Macedonians from the earliest days until today. From the large number of locations, we single out the most important tourist places, facilities and events that Macedonians should visit.

The second part mentions tourist places, facilities and events in neighboring countries, as well as in other countries on the Balkan Peninsula and in Europe, which should be visited by Macedonians, because they are important for Macedonian patriotic identity and cosmopolitanism.

In the third part, there are listed tourist locations in countries on other continents that are significant for Macedonians and should be visited for the purpose of strengthening Macedonian patriotism, identity and cosmopolitanism.

The selection of tourist locations - places, objects and events are grouped by time period of creation, type (natural and anthropogenic) and geographical location.

At the end, in the conclusion, we give an overview of sister cities from Macedonia with cities in the world, and there are over 300 cities that Macedonians should know and visit for the sake of tourism promotion of Macedonia and the Macedonian people in the world.

**Key words:** tourism, places, facilities, events, Macedonia, Macedonians
**JEL Classification:** Z32 Tourism and Development; Z39 Tourism: Other

## INTRODUCTION

Each country takes care of its national identity first in the home country, then for its presence in the immediate environment and more widely around the world.

Today, the promotion of one's homeland can be practiced through various forms of tourist visits to places, objects and events significant for the national identity. Whether the Macedonians will do it with a physical presence individually, in groups through travel agencies or virtually - using the Internet - modern technology for information and education, is a personal decision of every Macedonian.

[1] Identity of the author: Ethnic Macedonian, eight generation (Cvetan, Pavle, Dimitria, Georgia, Naum, Jon, Venko, Nikola), speaks the Macedonian language, writes with the Macedonian alphabet, cherishes the Macedonian traditions and lives in Macedonia.

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Therefore, Macedonians should, throughout their lives, visit tourist places, facilities and events in as large a number as possible, and constantly educate themselves, which will strengthen their personal - Macedonian identity and strengthen their self-confidence.

Also, in the part of self-education via the Internet, it is desirable to read domestic and foreign digital literature (books, monographs, scientific papers, etc.), then to search websites of travel agencies (tourist offers and programs), web pages of tourist places, facilities and events, from which you can get a lot of useful information about Macedonia and Macedonians.

In the specific case, Macedonia[2] (today only its northern part is a sovereign state: the Republic of North Macedonia[3])) and the Macedonian people need to use tourism services in various ways to promote themselves in the world.

After all, the Republic of North Macedonia has a long and rich history, it has a diverse natural and cultural heritage. In the UNESCO register, RNM it participates in the total world heritage with only two heritages: Natural and cultural heritage of the Ohrid region and Ancient and primeval beech forests of the Carpathians and other regions of Europe. (Dimitrov, V. N., 2024)

We hope that this text will contribute to tourist affirmation, in general, of Macedonia, and will arouse interest among Macedonians in tourist patriotism and identification in the homeland and around the world.

## MATERIAL AND METHODS

When compiling the text, literature and several methods were used, namely: method of description, inductive-deductive method, method of analysis and synthesis, method of abstraction and concretization, method of classification and method of generalization.

## RESULTS AND DISCUSSION

In the list of natural heritage of R.N. Macedonia includes 4 national parks (171,063 hectares), 4 strict national reserves (12,855 hectares), 3 areas with exceptional natural features (2,338 hectares), 14 different plant and animal species that live in areas outside the nature reserves (2,709 hectares) and 33 natural areas in the category of the so-called "monuments of nature" (61,655 hectares). While, for cultural heritage, there are 10,974 objects registered as immovable cultural heritage (4,361 archaeological sites; 1,726 churches and monasteries with over 150,000 square meters of wall fresco painting; followed by mosques; protected houses; monuments; etc.) and 500,000 museum relics (Dimitrov, V. N., 2020).

According to the national institution, Administration for the Protection of the Cultural Heritage of the RSM, 77 goods have been entered into the register of intangible spiritual heritage, however, their number is several times more than the stated number, but, unfortunately, they have not yet been placed in the Register. (Dimitrov, V. N., 2024).

In this paper (it can be said that it is a continuation of the ones cited above, Dimitrov, V. N. 2020; Dimitrov, V. N. 2024), we identify several tourist places, facilities and events that Macedonians, a greater number of them, should visit in their lifetime. Also, through this

[2] Macedonia as a territory has existed for 3 millennia or 2832 years, counted from 808 AD. for example AD until today. Throughout history, Macedonia existed as an independent kingdom, and then began two millennia of subjugation by various conquerors, who divided it and changed its name. But there were also periods when parts of Macedonia were independent, and in the last nine decades only the northern part is a republic and an independent state. The diverse past has contributed to the territory of Macedonia having an invaluable cultural heritage.

[3] Additions to the name Macedonia due to political reasons in the last eight decades (1944-2019): Democratic Federal Republic of Macedonia, DFRM (1944-1946); People's Republic of Macedonia, PRM (1946-1963); Socialist Republic of Macedonia, SRM (1963-1991); Republic of Macedonia, RM (1991-2019), recognized by 133 countries worldwide; application to the UN with temporary reference Former Yugoslav Republic of Macedonia, FYROM (1993-2019); Republic of Northern Macedonia, RNM, North Macedonia (Republic) (2019-). https://en.wikipedia.org/wiki/North_Macedonia retrieved on 08.04.2024. In the text, we will use the abbreviated name of the country, that is, only the initial letters of the adjectives or RN Macedonia.

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manuscript, we initiate the state services in the Republic of Macedonia (Administration for the Protection of Cultural Heritage, the Ministry of Culture and Tourism, the Agency for Support and Development of Tourism and other institutions) to create a Register of natural and cultural places, objects and events, which are significant for Macedonia and Macedonians and are located in countries in the immediate neighborhood and more widely around the world.

## 1. Tourist places, facilities and events in RN Macedonia that Macedonians should visit

The first part mentions tourist places, facilities and events that occur on the territory of the Republic of Macedonia. We are talking about a large number of locations that reflect the uniqueness of Macedonia and the Macedonians from the most ancient past to the present day. The selection of tourist locations - places, objects are grouped according to the time period of creation, type (natural and anthropogenic) and geographical location - location.

According to the Spatial Plan of the Republic of Macedonia 2002-2020, 10 tourist areas, 54 tourist zones and 195 tourist sites are distinguished in the regionalization of tourist areas. So, out of about 200 tourist sites, 80 sites are for activities in natural and historical settings, 47 are for water activities, 34 for snow activities, 29 (34) urban, 4 main interstate connections. (SPRM, 2004)

From the large number of locations, we single out the most important tourist places, facilities and events in the RN Macedonia, which Macedonians should visit in large numbers in their lifetime.

**Table 1.** Part of natural - geographic tourist places and facilities in RN Macedonia that Macedonians should visit

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| **PLACES** | Mountains (26 mountain massifs with about 80 mountains and 5 mountains as separate spatial units); High mountains with over 2500 masl are 5 mountains (Korab, Shar Planina, Baba, Mokra, Nidze), 9 mountains from 2000-2500 masl; 50 mountains from 1000-2000 masl and 17 mountains from 500-1000 masl.). Mountain passes (Straza, Preseka, Bukovo, Djavato, Pletvar, etc.).<br>Caves: 346, the most famous are: Slatinski Izvor, Ramnishte, Gjonovica, Dona Duka, Puralo, Bela Voda, Jaorec, Peshna, Sharkova Dupka, Matka 1, 2, 3, Vrelo, Veligdenska, Bozguni, Makaroec and others.<br>Volcanic and post-volcanic forms (volcanic mound "Pilav Tepe", volcanic mounds of Kozhuf, "Kostoperska karpa" - basalt mound near Mlado Nagoricane, Kratovo, Lesnovo, solfatara "Duvalo" near Kosel, etc.); Denudation forms (Stone pillars "Doll", Bošava - "Dolls", Kozhuf "Earth pyramids", Konopiste - "Stone pillars", Markovi Towers - Stone figures, "Saint or "Elephant" / "Stork", "Devil's Wall", Selechka Mountain - "Moma" rock, Mariovo - "Stone Mushrooms", Treskavec - "Golden Apple" and others.<br>Over 14 larger gorges and canyons (Dervenska, Taorska, Veleshka, Demirkapiska, Skochivirska, Šishevska, Istibanjska, Baderska, Brodska, Pesti, Barić, Matka, etc.);<br>Large springs: the spring "Ostrovo" on Crn Drim, Vevchan springs, Biljanini springs, the spring of Vardar in the village of Vrutok, the spring of the Treska river in the village of Izvor, the spring of Crna Reka in the village of Zheleznec, the spring of the Babuna river, etc.<br>Rivers: In RNM there are about 1600 watercourses (rivers, creeks, streams, occasional watercourses - drylands, ravines, etc.) with a total length of 11,640 km. However, only 82 rivers are longer than 20 km. Of these, only 4 are longer than 100 km (Vardar, Bregalnica, Crna Reka and Tresca), 6 are between 50 and 100 km long (Pčinja, Kriva Reka, Strumica, |

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| | Babuna, Radika and Zletovska Reka) and 72 rivers are 20 up to 50 km (Topolka, Bosava, Doshnica, Turija, Kriva Lakavitsa, Shemnica, Markova Reka, Pena, Daragor, etc.). The remaining 810 watercourses are longer than 5 to 20 km, and about 700 are less than 5 km in length.<br>There are several waterfalls in RNM, of which over 20 are more significant: Korabski (with a height of 136 meters), Belovishki (80-100 m.), Smolarski (39.5 m), Koleshinski, Gabrovski, Gjavolski, Brnicki waterfall, etc.<br>There are over 180 lakes in RnM, of which 3 are natural tectonic (Ohrid, Prespa and Dojran), 42 natural glacial and post-glacial lakes, 19 other natural lakes (swamp, denudation, cave, Urvin, etc.), 17 larger artificial and smaller about a hundred lakes.<br>National parks 4 (Pelister, Mavrovo, Galichica and Shar Planina), nature reserves (4), areas with exceptional natural features (3), natural monuments (33), other forms of protection (14). |
| **FACILITIES** | Thermal mineral waters (65 springs), of which 8 thermal baths (Bansko, Kežovica, Negorska, Katlanovska, Banjiste, Kosovraskri, etc.). Hunting grounds and hunting reserves: 255, of which 142 are hunting grounds for small game and 113 hunting grounds for big game. |

Source: Dimitrov, V. N., and Koteski, C., 2015); Dimitrov, V. N., 2021); Dimitrov, V. N., 2020); Koteski, C. and Dimitrov, V. N., 2019); Markoski, B., 1996); Markoski, B., 2004); Vasilevski, D., 1995); Petrusevski, I. and Karkoski, B., 2014); Milevski, I., 2014), Dimitrov, V. N., 2024); Dimitrov. V. N., 2023)

**Table 2.** Part of anthropogenic tourist places, facilities and events in RN Macedonia that Macedonians should visit

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| **PLACES** | Archaeological sites (700) from the Paleolithic, Neolithic and Eneolithic periods amount to 222 sites, over 300 sites are sites from the Bronze and Iron Age. Only a few are arranged for a tourist visit ("Bay of Bones", "Magari" mound, "Govrlevo", "Kokino", "Tsocev Kamen"). Ancient deposits are 177 localities (cities: Lychnid, Heracleia, Stobi, Skupi, Pelagonia, Knežje, Persida, Idomenae, Gordinia, Isar, Vardarski Rid, Brazda, Stibera, Bargala, etc.). From the Roman period (settlements, fortifications, roads - 700 sites). Early Christian period (1139 settlements, fortifications and mines). Medieval monuments of culture 399 in the form of medieval settlements, fortresses, towers, roads, etc.).<br>Today, there are 1767 settlements in the Republic of Moldova, of which 34 are urban and 1733 are rural settlements. About 30 rural settlements are engaged in rural tourism (Brajchino, Ljubojno, Dihovo, Magarevo, Trnovo, Lazaropole, Galicnik, Janche, Gari, Vevcani, Vishni, Gorna Belica, Velestovo, Samokov, Nezhilovo, Bogomila, Smolare, Koleshino, Lesnovo, Zrnovci and others.). |
| | **Anthropogenic objects**: archaeological objects, churches, monasteries, graves, architectural bridges, clock towers, fortresses, monuments, museums, events, etc.<br>Cultural and historical monuments - objects from different periods.<br>Ancient Macedonia: early ancient necropolises, tombs in the village of Bonche, Kanda geoglyph, etc. Roman period (430 sacred objects - monuments, sanctuaries and individual objects). Early Christian period (414 necropolises, sacral objects and individual finds).<br>Medieval objects (704 necropolises, sacral objects and individual finds). Bridges (about 20), aqueducts (2). Wineries (over 60 commercial ones), Old bazaars (about 15 - Skopje, Bitola, Ohrid, Prilep, Veleska, Kratovo, Struska, Strumica, Kumanovo, Tetovo, Gostivar, Debar, Krushev, etc.). |

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| **FACILITIES** | Ambient city cores and old town architecture and old houses ("Shirok Sokak" - Bitola, Krushevo, Kratovo, Ohrid, Struga, Tetovo, Galicnik, etc.). Clock towers (in Skopje, Bitola, Prilep, Veles, Gostivar, Shtip, Kochani, Kratovo and Sveti Nikole). Old fountains and fountains (in Skopje, Bitola, Prilep, Shtip, Ohrid, Tetovo, Debar, etc.).<br>There are over 3,000 religious buildings in RNM (over 2,200 churches, chapels, monasteries, crosses, then about 700 mosques, mosques, about 100 cathedrals, synagogues and other religious buildings). Out of about 300 monasteries, 40 are active with lodgings and monasticism, about 130 with lodgings without monasticism and over 130 with monastery churches without lodgings.<br>Famous monasteries that should be visited: "St. Naum Ohridski", "St. John the Baptist" - Bigorski, "St. Joakim Osogovski", "St. Gavril Lesnovski", "Assumption of the Blessed Virgin Mary" - Marka, "Markov Monastery" - St. Demetrius, "St. Leontius" - Vodocha, "Introduction of the Blessed Virgin Mary" - Veljusa, "Assumption of the Blessed Virgin Mary" - Treskavec, "St. Jovan Pretecha" - Slepce, "St. George the Victorious" - Rajchica, "St. Archangel Michael" - Varosh, "St. Transfiguration" - Zrze, "Holy Mother of God - Pechista" and others.<br>Crosses: The highest Christian-Orthodox cross in the Republic of Macedonia is the "Millennium Orthodox Cross" on Mount Vodno, 66 meters high, located on the top of Krstovar, 1066 meters above sea level. Other high crosses are: "Dracevski cross" 63.5 meters high in Drachevo, then "Krushevski cross" 33 meters high is located on Busheva Mountain at the peak of Vrsnik (1595 masl), "Orthodox cross" in Aerodrom 33 meters high, "Prespanski cross" 30 meters high above the village of Podmochani, a cross on the Isar in Shtip, a cross in the village of Gari, a cross in the village of Lazaropole, a cross on the hills of Bair in Bitola, an "Orthodox cross" on Markovi Kuli in Prilep, a cross over Radovish and others.<br>Famous mosques and other religious buildings that should be visited: "Colorful Mosque" in Tetovo, mosques in Skopje, Bitola and other places, as well as Catholic churches in Skopje, Bitola, Ohrid, Strumica, Gevgelija, Bogdanci and other places.<br>In RNS Macedonia there are over 25 national cultural institutions (houses of culture, theaters, opera, ballet, philharmonic) over 30 museums located in several cities and villages (Archaeological Museum - Skopje, Natural Science Museum - Skopje, Museum of the City of Skopje, Museum of Macedonia - Ethnological Museum - Skopje, Museum of the Macedonian Struggle - Skopje, Museum of Contemporary Art - Skopje, Museum of Mother Teresa - Skopje, Museum of the Holocaust - Skopje, Museum in Bitola, National Museum in Ohrid, Museum of the Ilinden Uprising - Krusevo, National Museum - Prilep, Museum of Southwest Macedonia - Kicevo, Museum of Kratovo, Museum of ASNOM - Pelince , folk museums in Veles, Shtip, Gevgelija, Kumanovo, Strumica, Struga, Tetovo, Negotino, Sveti Nikole, Kriva Palanka, Kavadarci, Negotino, Demir Kapija, Berovo, Delchevo, Smilevo, Razlovci, etc.).<br>From state buildings, it is desirable to visit: the Assembly of the RSM, the Parliament. Other buildings that should be visited are: The Cathedral Church "St. Kliment Ohridski", Skopje Kale, the monuments of the "Macedonia" square, the "Macedonia" triumphal gate, "Filip II" square, "Karpošovo vostanie" and others in the capital Skopje. |

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| | In Ohrid "Circular Tourist Route" Square, monuments of St. Cyril and Methodius and St. Kliment and Naum, Dolni saraj, Gorni saraj, the church of St. Sofia, St. Jovan Caneo, St. Kliment Ohridski on Plaoshnik, Samuel's fortress, the Ancient Theater, St. Bogorodica Perivlepta, the Old Bazaar, other churches, etc. |
| **EVENTS** | Over 150 different manifestations, festivals, fairs, fairs, carnivals, religious holidays, religious liturgies, open business days, etc., of which about 50 are held in a rural environment. A large number of sports, economic, cultural, scientific, religious and other events are regularly organized throughout the year in cities and rural settlements. The most famous cultural summers and festivals are: "Ohrid Cultural Summer", "Skopje Summer", "White Nights", "Beatfest", "Strushki Poetry Evenings", "Manaki Brothers", "D" Festival, "Pivofest", " Skopje Jazz Festival", "Strumica Carnival", "Vevčanski Carnival", "Ilin days", "Ten days of the Krushev Republic", "Tikvesh vintage", "Stip pastramilada", "Veleshka pitiya", "Stobi fest of ancient drama", "Racin meetings", "Galic wedding", etc. |

Source: Dimitrov, V. N., and Koteski, C., 2015); Dimitrov, V. N., 2021); Dimitrov, V. N., 2020); Koteski, C. and Dimitrov, V. N., 2019); Markoski, B., 1996); Markoski, B., 2004); Vasilevski, D., 1995); Petrusevski, I. and Karkoski, B., 2014); Milevski, I., 2014); Markoski, B., 2002); Dimitrov, V. N. and Metodijeski, D. and Koteski, C, and Angelkova, Petkova, T., 2027); Mikulcic, I., 1999); Strategy, 2021); Dimitrov, V. N., 2024); Dimitrov. V. N., 2023).


**Figures 1.** Tourist map of Republic Northen Macedonia (https://macedonia-timeless.com/eng)

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**Figures 2.** Part of important natural - geographical places and objects in RN Macedonia

**Figures 3.** Part of important anthropogenic tourist places, facilities and events in RN Macedonia

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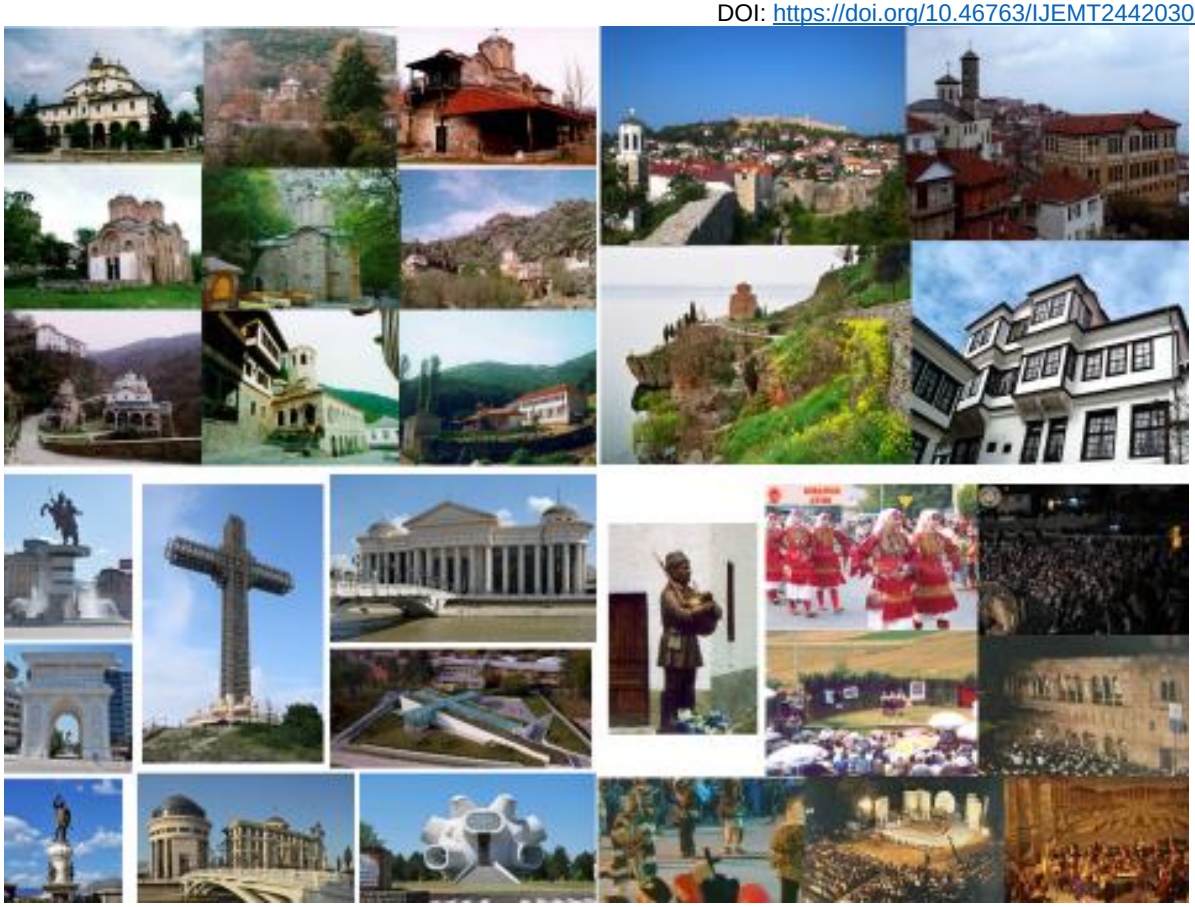

**Figures 4.** Part of important anthropogenic tourist places, facilities and events in RN Macedonia

## 2. Tourist places, facilities and events that are in neighboring countries, in other countries of the Balkan Peninsula and countries in Europe that Macedonians should visit

The second part mentions tourist places, facilities and events in neighboring countries, as well as in other countries on the Balkan Peninsula and countries in Europe, which should be visited by Macedonians, because they are important for Macedonian identity and cosmopolitanism.

The selection of tourist locations - places, objects and events are grouped by time period of creation, type (natural and anthropogenic) and geographical location.

**Table 3.** Part of natural - geographical tourist places and facilities in neighboring countries, other countries of the Balkan Peninsula and countries in Europe that Macedonians should visit

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|---|---|
| **PLACES** | Mountains: in Bulgaria - Rila (Musala peak 2925 m, Rila lakes and other places), Pirin (Vihren 2915 m); in Greece: Olympus (Mitikas 2918 m), Gramoshta (Gramos 2530 m), Pindus (Smolika 2637 m), on the peninsula of Sveta Gora (mountain and peak Athos 2033 m).<br>Caves: in Greece - "Petralona". Rivers: in Greece - Vardar and Bistrica; in Bulgaria - Struma; in Albania - Drim river; Lakes: in Greece - Kostursko, Ostrovsko, Malo Prespa Lake, etc.; In Albania - Mala Prespa, part of the Great Prespa Lake. |
| **FACILITIES** | In Greece: - Voden, "Voden waterfalls", thermal waters and waterfalls in "Požarsko", denudation forms "Meteors"; "Gavola Varosh" in Serbia and others. |

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Source: Dimitrov, V. N., and Koteski, C., 2022); Dimitrov, V. N., and Koteski, C., 2015); Dimitrov, V. N., 2021); Dimitrov, V. N., 2020); Koteski, C. and Dimitrov, V. N., 2019).

**Figures 5.** Part of important natural-geographic tourist places and facilities in neighboring countries that Macedonians should visit

**Table 4.** Part of anthropogenic tourist places, facilities and events in neighboring countries, other countries of the Balkan Peninsula and in Europe that Macedonians should visit

| | |
|---|---|
| **PLACES** | In Greece: cities of Thessaloniki, Lerin, Voden, Kostur, Kozani, Kukush, Negush, Ber, Enidze Vardar, Kaylari, Greben, Metsovo, Postol, Katerina, Serez, Drama, Neurokop, Dolna Jumaya, Kavala. Visit to archaeological sites and ancient cities of Pella, Ayga or Kutlesh (Vergina), Dion, Olympia, Pydna, Stagira, Neapolis, Philippi, etc. As well as the Halkidiki peninsula and the island of Thassos.<br>In Bulgaria: Sofia, Gorna Jumaya - Blagoevgrad, Razlog, Bansko, Sandanski - Sveti Vrach, Gose Delchev - Nevrokop, Melnik, Petrich, Varna, Plovdiv and others. In Albania: Podgradec, Korca, Kruja, Elbasan, Berat, Durres, Tirana. In Kosovo: Prizren, Prishtina. In Serbia: Trgoviste, Vranje, Belgrade, Novi Sad, Nis, Vrsac and others. In Croatia: Zagreb, Split, Rijeka, Dubrovnik, etc. In Slovenia: Ljubljana, Maribor. In Bosnia and Herzegovina: Sarajevo, Mostar. In Montenegro: Podgorica, Budva.<br>Visiting European cities with touristic value and inhabited by Macedonians. In Italy: Rome, Venice, Naples, Milan, Turin, Bari, etc. In Austria: Vienna. In Germany: Munich, Keln, Berlin, etc. In France: Paris, Marseille, Epinal, etc. In Norway: Oslo. In Sweden: Stockholm and Malmö. In Finland: Helsinki. In the Netherlands: Amsterdam and The Hague, etc. In Denmark: Copenhagen In Belgium: Brussels. In Great Britain: London, Manchester, Liverpool, etc. In Spain: Madrid, Barcelona, Palma de Mallorca. |

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| | Visit to small towns and villages in neighboring countries where Macedonians live. In Greece: Ovcharani, Golno Vrbeni or Ekshi Su, German, Verbeni, Armenovo, Buf, Banitsa, etc.; in Bulgaria: Bansko, Razlog, Kresna, Belica, Simitli, Strumjani, etc.; in Albania: Pustec, Tuminec, Globochani, Shulin, Cerje, Gorica, Shishtavec, Borje, Krosharishta, etc., in Serbia: Jabuka, Kacharevo, Pladniste, Glogolj, etc.; in Kosovo: Restelica, Krushevo, Brod, Dragash, and others. |
| **FACILITIES** | Archaeological objects: In Greece: Old Macedonian ancient tombs (of Philip II in the village of Kutlesh), palaces, monuments (monument near Heronea, Philippion in Olympia, etc.). Visit to the baptismal font in Philippi, Rachce village near Kavala, where Apostle Paul baptized St. Lidija Macedonian. Visit to the fortresses of Thessaloniki and Zandan Kule, then the fortress of Kavala, the island of St. Achilles and the tomb of King Samuel, the church of St. Dimitria in Thessaloniki, the church of St. Nicholas in Kavala, the monasteries of Meteori, Sveta Gora and other buildings. In Italy: Tomb of Perseus (the last Macedonian king, the tomb of Perseus is located near Megliano del Marsi. (Tomb of Perseus of Macedon - Maqliano de` Marsi. Colosseum in Rome and the Vatican. Church of St. Clemente, where in the cellars - catacombs is the tomb of Saint Cyril of Thessaloniki from Macedonia). In Albania: a visit to the medieval fortress of Gjorgi Kastriot or Skender Beg in the city of Kruja, and the memorial house - Sterjo Spase museum in the village of Globochani.<br>Visiting the monuments of St. Cyril and Methodius in several European countries and places: in Greece - Thessaloniki; in Bulgaria - Sofia and a visit to the Rila Monastery and a visit to the grave of Jane Sandanski in Melnik. In the Czech Republic - Prague, Velhgrad, Mikulčić, Olomouc and Trebić. In Ukraine - Kyiv and Donetsk. In Russia - Saratov, Khanto - Mansiysk, where a procession is held. In Serbia, visit to the monastery of St. Prokhor Pchinsky. In Belgrade, a visit to the Museum of Nikola Tesla - distant family roots from Macedonia, settled in Lika at the end of the 17th century), a visit to the monastery of St. Prokhor Pchinsky. Visit to Idvor in Southern Banat - the birthplace of Mihaljo Pupin - family roots from Macedonia (from the village of Vevcani). In Croatia - the Koco Racin monument in Samobor and the Orthodox church in Zagreb. City Museum of Zagreb - memorial room of Miroslav Krleža (distant family roots from Macedonia, from the end of the 17th century), in Gospić, Lika - visit to Nikola Tesla memorial center. In Montenegro, a visit to Saint Vasilij Ostroski. Visit in Romania to the Church of St. Petka in the city of Iasi. Visit in Germany, the city of Elwangen, memorial plaques of St. Methodius, who spent part of his life in captivity in prison. Visiting churches of the Macedonian Orthodox Church - Ohrid Archdiocese in Malmo - Sweden, in Zagreb - Croatia, in Berlin, Mainz and Sindfelingen - Germany, in Tringen - Switzerland and other places. In France - Paris visit to Mont Martyr, Alphelou Tower, Arc de Triomphe, Louvre, etc. In Great Britain - London, etc. Visit to Moscow and Saint Petersburg in Russia. Visit to Kyiv, Odessa in Ukraine. |
| **EVENTS** | Visiting various events - festivals and other manifestations in Greece, Bulgaria, Serbia, Albania, Kosovo, Turkey, Montenegro, Bosnia and Herzegovina, Croatia, Slovenia, and others in European countries in which Macedonians also participate ("Ilinden" in Ovcharani and fig.). Visit to various events in neighboring countries and in other European countries, organized by Macedonians. |

Source: Dimitrov, V. N., and Koteski, C., 2022); Dimitrov, V. N., and Koteski, C., 2015); Dimitrov, V. N., 2021); Dimitrov, V. N., 2020); Koteski, C. and Dimitrov, V. N., 2019); Dimitrov, V. N. and Metodijeski,

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D. and Koteski, C, and Angelkova, Petkova, T., 2027); Mikulcic, I., 1999); Strategy, 2021); Dimitrov, V. N., 2023); Perseus (212 - 165 BC) - the last king of ancient Macedonia:, Bitola, 2009); Dobrushevski, K., 2009); Todorovski, D., 2009).

**Figures 6.** Part of importans anthropogenic tourist places, facilities and events in neighboring countries, other countries of the Balkan Peninsula, in Europe and World that Macedonians should visit

## 3. Tourist places, facilities and events that are in other countries on other continents that Macedonians should visit

In the third part, there are listed tourist locations in countries on other continents that are significant for Macedonians and should be visited for the purpose of strengthening Macedonian self-affirmation, identity and cosmopolitanism.

The selection of tourist locations - places, objects and events are grouped by time period of creation, type (natural and anthropogenic) and geographical location.

In this section we are talking about a large number of settlements - cities and states where many Macedonians live and work.

**Table 5.** Part of natural-geographical tourist places and facilities located in other countries outside the European continents that Macedonians should visit

| | |
|---|---|
| **PLACES** | Mountains and peaks: Himalayas - peak Mount Everest (Nepal), Karakoram - peak K2 (Pakistan), Pamir peak Ismail Sanani (Tajikistan), Caucasus peak Elbrus (Russia), Erciyes, Ararat (Turkey), Albros - peak Damavan (Iran), Kilimanjaro (Kenya), Andes - Acongagwa (Argentina), McKinley Peak Denali (USA), Atlas (Morocco), etc.<br>Rivers: Volga (Russia), Nile (Egypt), Mississippi (USA), Amazon (Brazil), etc. Lakes: Great Lakes of the United States and Canada. Waterfalls: Niagara (USA - Canada), Iguazu (Brazil - Argentina), Victoria (Zambia - |

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| | |
|---|---|
| | Zimbabwe), etc. Denudation forms: Cappadocia (Turkey), Pamuk Kale (Turkey) and others. National parks, etc. |
| **FACILITIES** | Various landforms - deserts, volcanoes, caves, etc. |

Source: Dimitrov, V. N., and Koteski, C., 2022); Dimitrov, V. N., and Koteski, C., 2015); Dimitrov, V. N., 2021); Dimitrov, V. N., 2020).

**Table 6.** Part of anthropogenic tourist places, objects and events that are in other countries outside the European continents that Macedonians should visit

| | |
|---|---|
| **PLACES** | Visiting cities of millions in America, Asia, Africa, Australia where Macedonians live. Tourist places: Pyramids of Giza, Hurghada and Shar Mel Sheikh (Egypt) and many others.<br>Visiting cities: in the USA - Chicago, Detroit, Miami, Los Angeles, San Francisco, Visiting cities in Canada - Toronto, Montreal, Vancouver, Ottawa. Visit to the cities of Tashkent (Uzbekistan), Doha (Qatar). Beijing, Shanghai (China), Tokyo and Osaka (Japan), Brasilia, Rio De Janeiro (Brazil), Tashkent (Uzbekistan) and other cities. |
| **FACILITIES** | In Asia: visiting Pyramids of Giza (Egypt), visiting Israel and Palestine - Jerusalem, Nazareth, and the tomb of Jesus Christ. In Turkey - visit to the house of St. Maria - Virgin Mary in Ephesus, in Istanbul - St. Sofia, then Izmir, Ankara and other cities and tourist spots. Visit to the ancient city of Persepolis in Iran. Visit to Babylon - Baghdad in Iraq, etc. In Nepal - Himalayas, a visit to the memorial of Dimitar Ilievski Murat. In Afghanistan, a visit to a church - chapel of St. Nicholas in Kabul.<br>In America: Visiting Orthodox churches of the MOC Ohrid Archdiocese in the USA: Gary - Indiana, Columbus - Ohio, Syracuse - New York and other places. Visit to the Nikola Tesla Monument in Niagara Falls. Churches in Toronto and Hamilton in Canada.<br>In Australia: visiting churches in Sydney, Melbourne, Perth, Adelaide, Wollongong, Canberra, Brisbane, Sutherland in Australia. Church in Wellington - New Zealand.<br>In Africa, in Egypt: visiting the pyramids of Giza, the museums of Alexandria and Cairo.<br>Visit to embassies of the Republic of Macedonia around the world.. |
| **EVENTS** | Visiting various events in the USA, Canada, Australia, New Zealand and other countries, especially those organized by Macedonians. |

Source: Dimitrov, V. N., and Koteski, C., 2022); Dimitrov, V. N., and Koteski, C., 2015); Dimitrov, V. N., 2021); Dimitrov, V. N., 2020).

## CONCLUDING

The text we present may have contradictions, but it is still the first attempt to present an alternative view in one place, how through a physical or virtual tourist visit to places, objects and events, Macedonians can get more information to promote themselves and thereby also promotes his homeland Macedonia.

In addition to the conclusion, an overview of the Macedonian cities that are twinned with about 300 cities from 40 countries in the world has also been moved. The largest number of cities and countries are from Europe (over 200 cities from 30 European countries), and the remaining cities and countries are from other continents. In general, the twin cities can significantly influence the increased tourist movements and promotion of Macedonia and Macedonians.

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**Table 7.** Overview of cities from RS Macedonia that are twinned with cities from countries in the world that Macedonians should visit

| Town | Twin cities (countires) |
|---|---|
| **City of Skopje with the city monucipalities** | City of Skopje: Bratford - England (Great Britain), Schlef (Algeria), Dijon and Roubaix (France), Dresden and Nuremberg (Germany), Ankara, Istanbul, Izmir and Manisa (Turkey), Ljubljana (Slovenia), Nanchang (China) , Tempe - Arizona and Pittsburgh - Pennsylvania (USA), Podgorica (Montenegro), Sarajevo (Bosnia and Herzegovina), Suez (Egypt), Tirana (Albania), Varem (Belgium), Belgrade and Nis (Serbia), Zagreb and Pula (Croatia), Zaragoza (Spain), Lecce (Italy), Craiova (Romania), Tashkent (Uzbekistan), Sofia and Pernik (Bulgaria), East York - Ontario (Canada), Wroclaw (Poland), Tashkent (Uzbekistan), Tirana (Albania).<br>Skopje - Airport: Pazardzhik (Bulgaria);<br>Skopje - Center: Stari Grad - Belgrade (Serbia), Beyoglu (Turkey);<br>Skopje - Gjorce Petrov: Kraljevo (Serbia), Krasna Poljana - Sofia (Bulgaria), Kusadasi (Turkey), Povazhka Bistrica (Slovakia)<br>Skopje - Karpoš: New Belgrade - Belgrade, Sremski Karlovci and Vrljačka Banja (Serbia), Stari Grad - Sarajevo and Travnik (Bosnia and Herzegovina), Triadica - Sofia (Bulgaria). |
| **Bitola** | Epinal (France), Center - Vienna (Austria), Bursa (Turkey), Kremenchuk (Ukraine), Pushkin and Nizhny Novgorod (Russia), Trelleborg (Sweden), Rockdale, New South Wales (Australia), Pleven and Veliko Tarnovo (Bulgaria) ), Pozarevac and Stari Grad - Belgrade (Serbia), Kranj (Slovenia), Herceg Novi (Montenegro), Rijeka (Croatia), Ningbo (China), Voden and Kozani (Greece), Kaisersautern (Germany), Gorica (Albania). |
| **Prilep** | Asenovgrad and Ruse (Bulgaria), Dayang (China), Radom (Poland), Garfield - New Jersey (USA), Topolčany (Slovakia), Vincent (Australia), Tire - Izmir (Turkey), Chernihiv (Ukraine), Koper (Slovenia) ), Verona (Italy), Zadar (Croatia). |
| **Ohrid** | Wollongong (Australia), Vinkovci (Croatia), Kragujevac and Zemun (Serbia), Piran (Slovenia), Windsor (Canada), Budva (Montenegro), Pogradec and Tirana (Albania), Cannes - Normandy (France), Jalova and Safranbolu (Turkey), Plovdiv and Veliko Trnovo (Bulgaria), Podolsk (Russia), Yalta (Ukraine), Sengnam (South Korea), Patras (Greece), Dalyan (China), Katwijk (Netherlands). |
| **Veles** | Pernik and Svishtov (Bulgaria), Slobozia (Romania), Sombor and Užice (Serbia), Samobor and Pula (Croatia), Nowogard (Poland), Can, Karslariaka and Princes Ostrov (Turkey), Celje (Slovenia), Thermaikos (Greece) , Zenica (Bosnia and Herzegovina). |
| **Kumanovo** | Prozor, Banja Luka and Bijeljinja (Bosnia and Herzegovina), Varaždin (Croatia), Gorni Milanovac, Leskovac, Novi Sad, Pancevo, Obrenovac, Vranje and Čukarica - Belgrade (Serbia), Kosovska Mitrovica, Gniljanje (Kosovo), Nikšić (Montenegro), Chorlu (Turkey), Plovdiv and Gabrovo (Bulgaria), Campina (Romania), Nicosia (Cyprus). |
| **Strumica** | Reykjavik (Iceland), Piacenza (Italy), Koper (Slovenia), Grujec (Poland), Elektrostal (Russia), Bijelo Polje (Bosnia and Herzegovina), Chopceac (Moldova). |
| **Tetovo** | Sterling Heights, Michigan (USA), Konya (Turkey), Kukush (Albania). |
| **Krushevo** | Foca (Bosnia and Herzegovina), Kotor (Montenegro), Užice (Serbia), Bansko, Koprivishtica and Kavarna (Bulgaria), Belgrade - Berat (Albania), Tijan (Croatia). |

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| | |
|---|---|
| **Struga** | Golemo Cekmedze (Turkey), Mangalia (Romania), Famagusta (Northern Cyprus), Waterbury, Connecticut (USA), Labin (Croatia). |
| **Kavadarci** | Boljevan, Gorni Milanovac and Kovin (Serbia), Ugljevik (Bosnia and Herzegovina), Izmail (Ukraine), Kemappasha (Turkey), Makarska (Croatia), Nasud (Romania), Dobrich, Panagjurishte, Pernik and Pleven (Bulgaria). |
| **Negotino** | Minervino di Lecce (Italy), Nadjakata (Hungary), Gradishka (Bosnia and Herzegovina), Črnomelj (Slovenia). |
| **Gostivar** | Akshisar and Kilis (Turkey), Smolyan (Bulgaria), Stari Grad - Sarajevo (Bosnia and Herzegovina). |
| **Kicevo** | Vratsa (Bulgaria). |
| **Valandovo** | Sivrihisar (Turkey). |
| **Bogdanci** | Kyustendil (Bulgaria), Kalinovac (Croatia). |
| **Gevgelia** | Indžija (Serbia), Karac (Turkey), Kotka (Finland), Sevlievo (Bulgaria), Sezana and Nova Gorica (Slovenia), Jablanica (Bosnia and Herzegovina), Pazin (Croatia). |
| **Radovish** | Velika Plana (Serbia), Seljuk, Aliaga, Tashkopru, Jalova, Cinarcik and Egrene - Tekidrag (Turkey), Kaminates - Podilski (Ukraine), Drajanovo and Teteven (Bulgaria), Belishke (Croatia), Kontursi Terme (Italy), Vaslui ( Romania), Zaprudnyaya (Russia). |
| **Berovo** | Bruce (Serbia), Livaro (France). |
| **Delcevo** | Simitli, Mladost - Varna and Blagoevgrad - Gorna Jumaya (Bulgaria), Gorazde (Bosnia and Herzegovina), Jagodina (Serbia), Bornova (Turkey), Žirardów (Poland), Vyshgorod (Ukraine). |
| **Vinica** | Виница (Украина), Тревна (Бугарија). |
| **Kochani** | Kazanlak (Bulgaria), Sighetsentmiklos (Hungary), Yenifoca (Turkey), Križevci (Croatia), Perejaslav (Ukraine), Novi Kneževac (Serbia), Kranj (Slovenia). |
| **Shtip** | Balikesir, and Kirklareli (Turkey), Kvarna, Gotse Delchev or Nevrokop, Strazhi and Kyustendil (Bulgaria), Split (Croatia), Gyongosh (Hungary), Leža (Albania), Ploiesti (Romania), Murska Sobota (Slovenia). |
| **Kriva Palanka** | Samberville (Belgium), Dupnica and Bansko (Bulgaria), Mlava (Poland), Lugozh (Romania), Perescun (Ukraine), Svidik (Slovakia), Vrsac (Serbia), Žunanja (Croatia). |
| **Kratovo** | Kolomyia (Ukraine). |
| **Probishtip** | Aleksinac (Serbia). |
| **Debar** | Lom (Bulgaria), Gjakovica (Kosovo), Kapakli (Turkey). |
| **Resen** | Bar (Montenegro). |
| **Demir Hisar** | Prijedor (Bosnia and Herzegovina). |

Source: Websites of cities and municipalities form RN. Macedonia https://en.wikipedia.org/wiki/List_of_twin_towns_and_sister_cities_in_North_Macedonia retrieved 20-26.10.2024 year

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# OPPORTUNITIES FOR THE DEVELOPMENT OF RELIGIOUS TOURISM IN BULGARIA

**Slavi Dimitrov**
"St. Cyril and St. Methodius" University of Veliko Tarnovo, Faculty of Economics, Republic of Bulgaria,
s.dimitrov@ts.uni-vt.bg

**Abstract**
Religious tourism is a specialized type of tourism in which people travel individually or in groups to religious destinations, outside their usual environment, in order to consume religious values in one form or another. Religiously motivated travel is as old as religion itself, and thus religious tourism is the oldest type of tourism dating back to ancient times. Bulgaria has significant religious tourism resources and can specialize in this type of tourism.

**Key words:** Tourism, religious tourism, monasteries, pilgrimage.
**JEL Classification: L83**

## INTRODUCTION

Modern tourism is a complex socio-economic and cultural phenomenon of our time. In addition to traditional types of tourism, modern (alternative, specialized) types of tourism are gaining more and more importance (Patarchanov, 2012). Religious tourism is among them.
Religiously motivated travel is as old as religion itself, and therefore religious tourism is the oldest type of tourism, dating back to ancient times. As the earliest form of religious tourism, we can point to pilgrimage - trips to certain cult or holy places for the purpose of worship. Gradually, pilgrimage became the most widespread form of religious tourism.
Religious tourism is often intertwined, more or less, with other types of tourism. Its combination with cultural tourism is strongest (due to the nature of the objects visited), therefore it is often defined as part of it. Due to the significant information that is obtained in religious tourism, it also includes elements of cognitive tourism.
Based on the definition of cultural tourism, the definition of religious tourism acquires the following definition: "a specialized type of tourism - a tourist trip motivated by the satisfaction of religious needs through the consumption of religious values" (Kostov 2001).
*The object* of research is religious tourism in Bulgaria, and *the subject* of research are the possibilities for practicing religious tourism in Bulgaria.
*The purpose* of the present study is to examine all the possibilities and prospects for the development of religious tourism, based on the existing tourist resources in the country. *The methods* used are theoretical analysis and synthesis, historiographical method, etc.

## Exhibition

After nearly half a century of atheism and limitation of religious tourism, it is gradually finding its place in Bulgaria as well. There are 160 monasteries in the country, the most visited of which are Rila, Bachkovski, Troyanski, Klisurski, Dryanovski (fig. 1).

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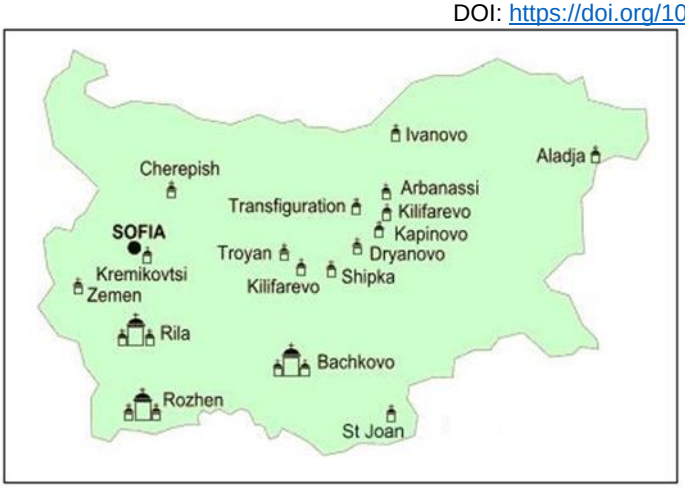


Figure 1 Monasteries in Bulgaria

There are also numerous monasteries in the vicinity of Veliko Tarnovo - Preobrazhenski, St. Troitsa, Petropavlovski, Kilifarevski, Kapinovski, etc. There are 1245 churches of cultural importance, which are also of tourist interest. Three of the Bulgarian sites included in the UNESCO World Natural and Cultural Heritage List are Orthodox churches - the Boyan Church, since 1979, the Ivanovo rock monasteries along the Rusenski Lom river valley, since 1979 and the Rila Monastery, since 1983. This is also a recognition of the world cultural and historical importance of these objects (Kolev 2015).

Pilgrimage in Bulgaria has been developed since ancient times. It is connected with traveling to holy places (mainly Jerusalem) and monasteries at home and abroad (Kostov 2001).

Even today, religious tourism in our country continues to be associated with visiting monasteries. Regardless of the alarming state of the significant part of them, more than 40 monasteries are involved in economic turnover through tourism. They can be grouped by location as follows:

1. Monasteries in North-West Bulgaria: Chiprovski, Lopushanski, Bistrishki, Karlukovski;
2. Monasteries in Northern Bulgaria: Cherepishki, Etropolski, Glozhenski, Tetevenski, Troyanski, Batoshevsky, Dryanovski, Kilifareski, Plachkovski, Kapinovski, Lyaskovski, Arbanashki, Preobrazhenski, Ivanovski rock monasteries, Aladzha monastery, etc.;
3. Monasteries in the Sofia area: Seven thrones, Kurilovsky, Seslavsky, Lozensky, Dolnopasarelsky, Alinsky, Dragalevsky;
4. Monasteries in Southwestern Bulgaria: Trunski, Zemenski, Boboshevsky, Rila, Rozhenski;
5. Monasteries in Southern Bulgaria - Sopotski, Shipchenski, Muglizhki, Kuklenski, Bachkovski, Arapovski, etc. (Kostov 2001).

A. Kazakov groups the monasteries according to their accessibility as follows:

- Excellent accessibility – availability of an airport within no more than 20 km, or a train station no more than 20 km away, an asphalted road to the monastery and reliably placed signs;
- Very good accessibility – availability of an airport or train station no more than 50 km away, availability of a road with a macadam surface and reliably placed signs;
- Moderately good accessibility – presence of an airport or train station no more than 50 km away, presence of a road with a macadam surface, but lack of signs, or extremely insufficient signs;
- Poor accessibility – availability of an airport or train station no more than 50 km away, dirt road (Kazakov 2013).

According to the time of establishment, we divide the monasteries into early Christian (IV - IX centuries), medieval (X - XV centuries) and young (XVI - XX centuries).

Kazakov also offers other criteria such as: geographical location (about 60% of them are located in the mountains); distance from existing settlements (there is only one monastery

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more than 10 km from one, 12 are located between 5 and 10 km and all the rest are within 5 km or within the settlement itself); availability of an accommodation facility; attitude of monastic brotherhoods towards visitors and tourists, etc. (Kazakov 2013).

Based on the capacity of the monastery (number of monks), the following main types of monasteries are classified:

- Monomonastery - with one monk;
- Small monastery - with two to five monks;
- Medium monastery - with five to twenty monks;
- Large monastery - with twenty to forty monks;
- Lavra - with over forty monks.

Small and medium-sized monasteries predominate in our country. Depending on their location, tourist companies include them in their programs (general and specialized). The most frequently offered monasteries are Rila, Bachkovski, Aladzha, Rozhenski, Troyanski, Preobrazhenski, Dryanovski, etc. Undoubtedly, the Rila Monastery (Kostov 2001) is of greatest interest to tourists, especially foreigners.

The boom in short-term religious trips in Bulgaria also contributes to this, the number of which increased from 25,000 participants in 1979 to over 1.7 million today. Of these, 93,746 were by foreigners or 5% of the visits. Visits to the three stauropygial monasteries in Bulgaria - Rila, Bachovski and Troyanski - amount to 3,779,572 people, 285,490 of whom are foreigners - 7.5% of the visitors. With 700,000 visits per year, the Rila Monastery is the most visited tourist site in Bulgaria (Dimitrov 2018).

There are large Catholic cathedrals in the cities of Plovdiv, Sofia, Ruse Rakovski.

Over 1,300 Muslim religious temples (mosques) were built in the country, and two of them have been converted into a museum. These are the mosques in the city of Shumen and the city of Samokov.

The synagogue in the city of Sofia is the most visited Jewish temple in Bulgaria and is part of the European cultural tourist route “The Way of the Jews”.

As leading factors for the development of religious tourism in Bulgaria, we can point out:

- Religious tolerance, characteristic of Bulgarian society (table 1);
- Temples of various religions located on the territory of the country;
- Strong cultural and artistic value of a large part of the religious temples;
- Pilgrimage characteristic both of past eras and of today;
- Specifically manifested syncretism of some religious practices, traditions and centers - common objects of worship of different religions;
- Relatively good infrastructure of the most visited sites.

Table 1. Religious structure of the population in Bulgaria, 2021

| Religion | Number | % |
|---|---|---|
| Eastern Orthodox | 4 091 780 | 71,5 |
| Catholics | 38 709 | 0,6 |
| Protestants | 69 852 | 1,1 |
| Muslims | 638 708 | 10,8 |
| A Jew | 1 736 | 0,02 |
| Other | 6 451 | 0,1 |
| They have no religion | 305 102 | 5,2 |
| I can't tell | 259 235 | 4,4 |
| I don't want to answer | 472 606 | 8,0 |

**Source:** NSI, 2022.

Religious tourism in Bulgaria has far from exhausted its development potential. Unlike cultural tourism, of which it is actually a variety, religious tourism in our country is not so modern as a topic of conversation for historians, archaeologists, museum curators, statesmen, municipal

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officials and tourism experts. The probable reason is the respect of the secular tourist figures for the Bulgarian Orthodox Church and for the institutions of the other official religions, managing the sites and events of interest for religious tourism in the country. If a country nevertheless wants to take a worthy place on the map of international religious tourism, its stakeholders should have a serious discussion to evaluate and improve the conditions for religious tourism travel in the destination.

An important prerequisite for attracting and serving religious tourists is knowing them as a target clientele. In the most general terms, religious tourists are known to travel to explore and experience places, objects and activities that represent authentic religious beliefs, events, personalities and temples both in the area of historical heritage and contemporary religious life of the local population. Modern religious tourism is practiced by intelligent people. The motivation of religious tourists corresponds mainly to the last, fifth level in the hierarchy of needs according to E. Maslow. These are people who travel to gain new knowledge, experiences, emotions, self-knowledge, self-respect and self-affirmation. In concrete terms, the group of religious tourists has its own marketing structure, expressed in certain sub-segments, which should be thoroughly studied and known. In our country, mainly foreign and Bulgarian tour operators collect information about religious tourists in a targeted manner. They care and know their motives, nationality, age, family and social status (Marinov 2008).

They use this information to create better and more diverse products according to tourists' expectations. Unlike tour operators, hoteliers, restaurateurs and religious officials in Bulgaria have little interest and know little about tourists participating in religious trips. They only give them to Bulgarians and foreigners. According to most of them, what pleases the Japanese cannot disappoint the Italians or the Spanish. The conclusion is that segment-oriented thinking and action is needed among all Bulgarian subjects with regard to the reception and service of religious tourists in the country (Marinov 2008).

An important condition for the development of religious tourism is the presence of religious attractions and the ability of the subjective factor to transform them into tourist products. Aleksieva and Stamov consider monasteries and churches as resources and destinations of religious tourism in Bulgaria (Aleksieva & Stamov 2006).

Bulgaria has over 160 monasteries, hundreds of churches and chapels, numerous religious holidays and customs. The listed resources represent diverse product cores, of which few are able to be present in salable tourism products of the destination. Examples of interesting but neglected religious sites abound in Bulgaria. An eloquent example is the Plakovski Monastery “St. Ilia”, which has an extremely rich history, but is abandoned and forgotten by Bulgarians, let alone offered to foreign tourists. Another example is the Preobrazhensky Monastery, abandoned to God's mercy, etc. The conclusion is that many of the attractive product cores of religious tourism in Bulgaria are combined with a repulsive physical environment and difficult accessibility, which excludes them from the possible product lines of the destination.

Successful religious tourism is conditioned by the implementation of a reasonable price and financial policy. From the point of view of religious tourists in Bulgaria, hotel prices are decent, and visits to religious sites are either free (most churches) or for reasonable fees (St. St. Constantine and Elena Church in Plovdiv). However, it is unacceptable in the modern electronic world not to be able to pay by bank for visiting organized groups of religious tourists, as well as by credit card in Bulgarian monasteries (Marinov 2011).

An important condition for the successful implementation of the Bulgarian religious tourism product abroad is the presence of an effective distribution system. Religious tourism in Bulgaria is realized mainly through the channels of several ambitious tour operators such as “Iskoni” Ltd., “Silky Holidays” Ltd., “Atlantic Travel” and others. The distributive merits of the State Overseas Trade and Economic Relations Service, of local municipal tourist information centers, and of the Internet in the hands of religious institutions are symbolic (Marinov 2011).

Spiritual institutions as the owner and manager of religious objects and attractions must play an increasingly tangible role in creating and supporting the consumption of these products. This will reflect in chances and opportunities - for the providers of tourist services (transporters,

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hoteliers, business centers, cultural and educational institutions, etc.), for travel agencies and the millions of tourists from all over the world for a better, humane and sustainably developing tourism (Neshkov 2007).

Not least in terms of importance for the development of religious travel in the country is the communication policy of Bulgaria as a destination for religious tourism. Printed publications such as the map "Monasteries in Bulgaria" and "Religious tourism in Bulgaria: map" contribute to the implementation of this policy, as well as electronic portals such as "Bulgarian Monastery ®" - www.bulgarianmonastery.com (an informative guide for monastery tourism in Bulgaria) and the Bulgarian Orthodox catalog on the Internet - www.pravoslavieto.com. It is necessary to enrich the communication of religious tourism in our country. It would be significantly more effective to communicate not only individual religious sites and events, and specific product lines and routes arranged by these objects and events (Ivanova 2008).

The disunity of the Bulgarian Orthodox Church and the underestimation of tourism as its main economic activity is a major problem for the development of religious tourism. Religious tourism in Bulgaria must become a link in the world chain of sacred tourism, which drives huge flows of tourists. It is necessary to develop programs for precisely defined monasteries. Only in this way can the monastic stream be oriented towards our holy places (Ivanova 2008).

## Conclusion

Undoubtedly, religious tourism in Bulgaria has potential for development. It has a future and can become a profitable profitable business in Bulgaria only with a correct policy, in which the Bulgarian Orthodox Church, tour operators, non-governmental organizations, and public figures are involved. However, it is very important that it does not become a self-serving business that brings only profit. This policy must become national because a nation that does not revere, protect and properly use its sacred places will depersonalize itself spiritually and will not be able to achieve stability and prosperity.

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# MANAGEMENT AND POSSIBLE SCENARIOS FOR THE DEVELOPMENT OF THE EUROCITY CHAVES-VERIN PROJECT

**Tatyana Dimitrova**
*"St. Cyril and St. Methodius" University of Veliko Tarnovo, Faculty of Economics, Republic of Bulgaria, t.dimitrova@ts.uni-vt.bg*

**Abstract**
The European Union (EU) and its territories depend on increased synergy between cohesion policies and strategies to promote competitiveness, as well as on the development of sectoral policies enabling less-favoured territories to face the challenges of globalization by applying cross-border, transnational and interregional approach. Cross-border, transnational and interregional cooperation has already added and continues to create added not only European, political, institutional, economic, but also socio-cultural value. Such an example of cooperation is Eurocity Chaves-Verin, located on both sides of the Spanish-Portuguese border.
**Key words:** The European Union, Cross-Border Cooperation, Eurocities.
**JEL Classification:** JEL: M12; M19

## INTRODUCTION

Cohesion policies are a major factor in achieving the goals of economic growth and solidarity, as well as in building a highly competitive, social and market economy aimed at full employment, social progress and sustainable development. Territorial cooperation and especially cross-border cooperation is becoming a key element in European integration and a political priority for the EU (Balibar 1998).
Countries, such as (Spain and Portugal), manage to take advantage of their border potential and gradually transform their border territories from laggards into centers of growth. The treaties between the national governments of the two countries are extremely important, with which the beginning of bilateral relations is established. In the national agreements, points of conflict between the Spanish and Portuguese political leaders are not sought, but on the contrary, reasonable and reasoned solutions are sought, which are the basis of administrative cooperation. In order for management to be successful, transformation of the existing organizational culture and improvement of management is necessary (Yordanova, 2023).
A typical example of such cooperation are the cities of Chaves and Verin, which are the basis for the creation of the first Eurocity in the northwestern part of the Iberian Peninsula.
*The object* of research are the features related to the development of the Eurocity Chaves-Verin project. *The subject* of research are the specifics, advantages and sustainability in the management of this project. *The purpose* of this study is to analyze the possible scenarios related to the future development of Eurocity Chaves-Verin. *The methods* used are theoretical analysis and synthesis, convergent analysis and graphic methods.

## Exhibition

The proximity of the cities of Chaves in northern Portugal and Verin in Galicia, Spain allows them to be classified as an agglomeration, despite being from different countries. Convergence is an opportunity to use the strengths and successful policies of both cities in order to achieve a common goal - overcoming social, economic, health, etc. problems. The formation of the Eurocity project offers the residents of both cities common social, cultural and economic benefits.
Eurocity Chaves-Verin aims to create a unique model of a cross-border, innovative and cooperative region that presents residents, through joint territorial planning, common management of urban services and joint overcoming of obstacles that hinder mobility. The Eurocity project aims to promote common services and policies in the fields of culture, tourism,

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trade, education, research and social policy. The promotion of territorial cooperation also strengthens social cohesion between the two communities, improving the quality of life of the people as a whole (Documento de Trabajo para la programacion 2014 – 2020, 2013).
The steps taken in this direction are related to various initiatives such as the development of a project that aims to prepare a map that contains information on general services and facilities, sports events, leisure, music and culture. The map has been positively received by the residents of both cities. Publishing monthly schedules of events held in both cities also helps foster a sense of belonging.
Measures to stimulate the local economy include - promoting tourism by focusing on the preparation of a common tourism brand with an emphasis on the thermal springs in the common area, as well as on the Tamega River, which is the link between the two municipalities. Local employers and employers' organizations also have a key role in promoting the two cities as destinations for shopping and other commercial activities. An online directory of employers looking for and offering jobs and other services has also been published. An unquestionably important point of the project is the promotion of entrepreneurship, by uniting young people and prestigious companies for the realization of business ideas. Joint training courses are also planned, which are mainly directed as a target group to young people with an entrepreneurial spirit (Dimitrova 2021).
The investment from the EU for the Eurocity Chaves-Verin project is worth 1,333,578 euros, of which 1,000,184 euros are from the European Regional Development Fund of the EU within the operational program “Spain – Portugal” for the current programming period (Programa Operativo de Cooperacion Transfronteriza Espana-Portugal 2007 – 2013, 2007).

**Socio-economic initiatives to promote cooperation**

In the 1970s, after a publication in the Spanish press, the border territories were defined as “underdeveloped”, due to the unfavorable conditions, due to the distance from the center, they were also defined as “weak periphery” (Medeiros 2011). As a result of the economic crisis that affected Europe in 2008, it undoubtedly affected the border between Spain and Portugal. Statistics show that 50% of young people in the border region are unemployed, with 44% of them affected long-term by the lack of employment (Eurostat regional yearbook, 2020). The collapse of some sectors, especially construction, is the reason for the return of a large part of the population to the cross-border area, which is the reason for the increase of the unemployed, especially in Chaves.
Compared to this period, to date there has been an undoubted improvement in the development levels of these regions, mainly due to EU funding, as well as programs aimed at these regions such as: cooperation within INTERREG I, II, III and IV.
Eurocity sets itself a common goal: ensuring a better quality of life for the people of the municipalities of Chaves and Verin by promoting sustainable development. It must be realized through:

- ✓ Confirmation and development of local business;
- ✓ Integration and promotion of the logistics sector;
- ✓ Assessment of the natural heritage (of particular importance for the Tamega River corridor) and cultural heritage;
- ✓ Encouraging the tourism sector to focus on the available resources and opportunities for the development of health and wellness tourism;
- ✓ Encouraging the development of human resources through various opportunities for training and retraining;
- ✓ Revival of sports activities through the construction of common infrastructure and diverse practices, especially in Verin, as innovative opportunities for land use;
- ✓ Strengthening social cohesion;
- ✓ Optimizing cultural life through the use of infrastructure and facilities (existing and in the planning process);

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✓ Development of rural areas by promoting the production of products specific to the area and introducing new activities.
✓ In connection with the set goal, a number of activities are carried out:
✓ An action plan presented by the Portuguese Secretary of State for Regional Development and the Galician Minister of Economy and European Affairs;
✓ Strengthening support for the office with the participation of a technical associate;
✓ Realization of numerous exhibitions in Eurocity Chaves-Verin, with the aim of increasing the awareness of the population about the project;
✓ Joint celebration of Children's Day;
✓ Traveling exhibition of young talents (painting, sculpture) from both cities;
✓ Creation of a general youth research group (of students) on topics related to the project;
✓ Conducting economic seminars for entrepreneurship;
✓ Two applications under the INTERREG IVA program (Eurocidade and Eurocitivas Aqua Novum) were presented in order to develop a project and study the potential of the most important resource - the hot mineral springs and their joint use;
✓ Free time and learning through some activities realized in the summer, for example to live together with languages, speaking in Spanish and Portuguese and joint activities for the children of the two municipalities in the field of tourism and sports;
✓ A protocol was signed according to which the citizens of the two municipalities have equal conditions when using the thermal facilities and the swimming pool in Chaves and the public sports facilities in Verin;
✓ Development of a strategic program for Eurocity in the coming years, covering society, EU citizenship, environmental actions and economic development.
✓ We can distinguish two types of activities that will contribute to the strengthening of cross-border spatial integration:
✓ Structural related to transport, infrastructure and economic development. At the beginning of the last decade, it was decided to connect Northern Portugal and Galicia by means of a motorway (8 km were missing). The project that was implemented is extremely important for Eurocity. From an economic point of view, it was extremely important to build a large logistics center including a fish market and a business incubator financed by INTERREG funds in the municipality of Chaves near the highway;
✓ Culture/tourism - these are related to projects that allow to promote the revival of ancient routes crossing the Eurocities, such as the cross-border route of smugglers and the traditional pilgrimage routes in the direction of Santiago de Compostela (specifically the Via de la Plata). A network of museums was built in the region, including the existing museums on the territory of Eurocity (Dimitrova 2021).

The next generation of projects related to the two municipalities are focused on the development of Eurocity, in addition, some other interregional projects could also be very important for Eurocity, such as the high-speed train project that should connect Spain and Portugal in the considered area, as well as infrastructure connecting the association of cities from the Atlantic axis. The resulting partnership between the cities of Chaves and Verin provides common opportunities in solving identical problems. Moreover, the strategy developed between the two cities is linked to the strategic policies of other cross-border structures, such as the Galicia-North Portugal Working Community and the Atlantic Axis organization.

After strengthening the integration processes in the 1990s, both cities increased their population, the number of young people who maintain permanent employment also increased, as well as active participation in the development of local initiatives to maintain the environment, rural areas, etc. Eurocity promotes collaboration and partnership in the context of European cross-border governance policies.

In terms of sustainable development, both cities are developing a common public transport and road safety map, complying with European Commission standards. Sustainable political solutions aimed at the development of the rural environment are implemented. In terms of

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construction, the emphasis is on building a high-speed highway to connect the two countries. Finally, in terms of economic policy, Eurocity integrates tourist packages around the thermal springs; promotes a common trade area (Open Border Trade) and specialized business forums. The development of these activities has a direct impact on urban areas.

Eurocity has a political and social presence, becoming the brand of the municipality and the regional government of the Galician region. In 2009 the Spanish magazine “Trips and Tourism” awards Eurosity Chaves-Verin with the “Best Tourist Destination of the Future” award. In addition, through the newly built institutions, the cross-border territory gets the opportunity to specialize in educational or university tourism.

The management policy of Eurocity includes a symbolic restructuring of the socio-political spaces that were used as border posts, for example, the former customs building was transferred from the Spanish state to Verin to be restored and transformed into a central office of Eurocity with the financial support of INTERREG. In this way, the border acquires another meaning, becoming a place for meetings and contacts.

The administrative and political decisions for the integration of Spain and Portugal in the European economic space contributed to “overcoming” the artificial political borders, as well as overcoming psychological barriers. The wide range of integrated services in Eurocity Chaves-Verin promotes cooperation and favors the economic prosperity of both cities. Some researchers report the beginning of a new period of relations between the two countries, related to the maximum use of the potential of the two cities. The cooperation in Eurocity Chaves-Verin is an example not only for Bulgaria, but also for all cross-border regions in Europe. In times when division is a fact, Spain and Portugal testify that the promotion of cooperation with well-balanced political decisions and the right management approaches can unite and ensure prosperity for the population, and also be an example especially for the more backward border countries regions between Bulgaria and neighboring countries.

**Possible options**

After the preparation of the strategic documents regarding the development of Eurocity Chaves-Verin and EGTC until 2030, it is important to foresee the options for the further development of this border territory. Three options are offered depending on the deepening of cooperation on both sides of the border. It covers not only Eurocity Chaves-Verin, but also the neighboring territories.

The question regarding the expansion of cross-border cooperation beyond the scope of Eurocity under consideration was raised already in 2015 (Trillo Santamaría & Lois González & Carril 2015). This is justified by the achieved results, and the idea is supported institutionally and by the population on both sides of the border. The possibilities for expansion on the Portuguese side are mainly focused on Alto Tamega and the municipalities of Montalegre and Barroso, and on the Spanish side, they concern the municipality of Verín, the neighboring territories of Swaledro and Oimbra, as well as some parts of the province of Ourense.

Formally, the process was hindered from an administrative point of view, but after the adoption of the new changes of NUTS III in Portugal carried out in 2013 (INE 2015), Alto Tamega received a more clearly defined territorial and institutional form, led by the CIM of Alto Tamega, acquiring clearer administrative competences.

On the Spanish side, however, the municipality of Verín corresponds to the association of municipalities, its status, competences and areas of action, although they are not equivalent to those of the CIM of Alto Tamega. This is important from the point of view of maintaining an institutional balance on both sides of the Spanish-Portuguese border.

Examining the main challenges and opportunities of these cross-border territories, they outline three possible options for future cooperation.

**Variant I: Maintain the existing framework**

The first option concerns the preservation of Eurocity Chaves-Verin in its current territorial scope (fig. 1). The progress achieved and the experience gained justify that this project is

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important from the point of view of cross-border cooperation in the EU countries and has a future.

There are issues related to the lack of scale, asymmetry between the two sides of the border and the insufficient institutional weight that Chaves and Verin have in their respective countries, leading to the consideration of other future positions.

Advantages:

✓ A stable structure for cross-border cooperation, whose participants in the person of the two cities of Shaves and Verin - have many years of experience in working together;

✓ Good interaction between the two municipalities and their work in a regional, national and Iberian context;

✓ Good image and presence of own brand, relying on the concept of an urban continuum separated by a state border;

✓ First project of a similar nature within the European cross-border cooperation;

✓ The Eurocity unites two cities with significant socio-economic and cultural complementarity, which are vibrant urban centers at the regional level and whose influence exceeds municipal borders;

✓ The project is developing well and in sync with the problems and expectations of the population (Eurocidade Chaves-Verin, AECT 2023).

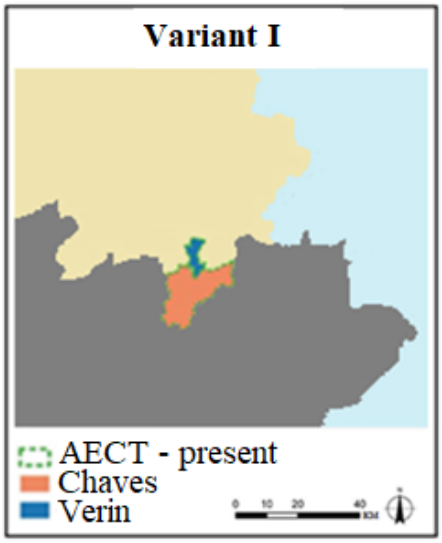


Figure 1 Variant I of territorial expansion
Source: Xunta de Galicia. (2019). Plan Estratéxico 2021-2030.

Disadvantages:

✓ The structure has imbalances in terms of territory and competences between the two member entities that make it up;

✓ Lack of greater institutional scale and weight, which makes it difficult for Eurocity Chaves-Verin to be an instrument for more effective regional development in the fight against the problems related to the peripheral location;

✓ There are objective difficulties in consolidating long-term initiatives, developing independent projects from EU funds and actively involving both public and private territorial agents;

✓ Lack of coverage of the benefits of cross-border cooperation in the areas of influence of Chavesh and Verin, in particular in the municipalities with which they have joint structures for inter-municipal cooperation and with which they share internal resources and certain socio-economic problems;

✓ The main identity elements of Eurocity Chaves-Verin, the resource “water” and the Tamega river, are shared by a wider territory that includes the municipalities of Alto Tamega

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and the Verin region. It is necessary to improve these elements, which will be beneficial for the inclusion of the other territories in the same cross-border cooperation structure ((Trillo Santamaría & Lois González & Carril 2015).

**Variant II: Moderate territorial and institutional expansion**

This option envisages the possible expansion of Eurocity Chaves-Verin, to which all the municipalities of Alto Tamega will join, as well as the adjacent municipalities of the Verin region. This expansion will be institutional, it will be joined by the CIM of Alto Tamega and the Provincial Council of Ourense, which are member-members of the EGTC (fig. 2).

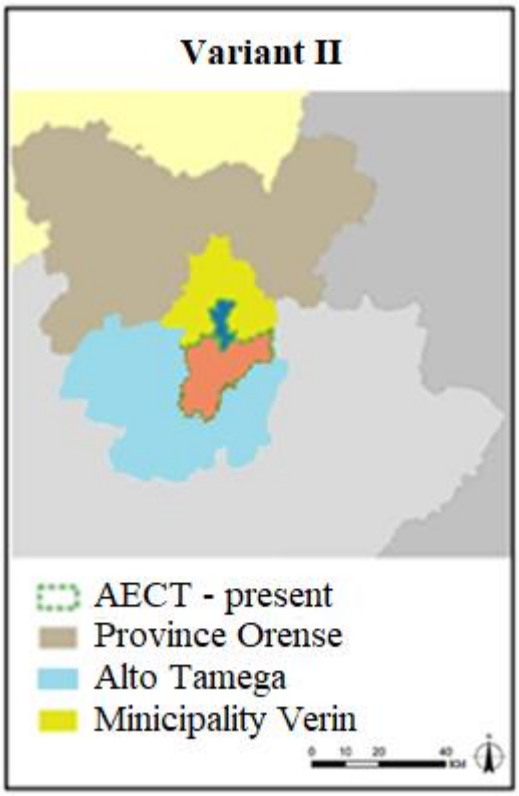


Figure 2 Variant II of territorial expansion
Source: Xunta de Galicia. (2019). Plan Estratéxico 2021-2030.

Advantages:

✓ Dynamization of cross-border cooperation by attracting more people and organizations, both from the public and private sectors;

✓ Integration of new member entities which, thanks to their supra-municipal character, will allow the strengthening of the institutional weight both on a regional scale and within Spain and Portugal. Despite the existence of legal frameworks that are different and specific to the respective countries, in terms of their fields of action and competences, they will receive a more significant representation than what exists among municipalities;

✓ More opportunities to implement structural projects on a regional scale and longer-term perspectives, allowing good coordination between municipal and non-municipal territorial strategies in a cross-border context;

✓ Development of strategies related to the evaluation and use of the available endogenous resources, including the hydro resources and waters of the Tamega River, especially in the territory where they are located;

✓ More opportunities to attract investments, incl. foreign, taking into account the 2021-2027 program period and the funds intended for the development of cross-border cooperation.

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Disadvantages:

✓ Need to adapt the EGTS strategy to the inter-municipal logic and on a supra-municipal scale, necessary for a future expansion;

✓ Possible loss of the essence of the Eurocity idea and the possibilities for cross-border cooperation with the help of projects;

✓ The lack of experience and the inclusion of new subjects in this cooperation can lead to problems in the consolidation of the culture of cooperation and the need for joint work between the new participants;

✓ Possible difficulties related to the new entities, the general action plan and the new strategic documents for future development;

✓ The existence of an imbalance between human resources, territorial scope and opportunities for economic prosperity on both sides of the border (Xunta de Galicia 2019).

**Variant III: Territorial and institutional expansion**

The third option is the most optimistic and at the same time the most difficult to implement. With it, there is a need for greater territorial and institutional expansion, and it implies the inclusion of new territories by Spain and Portugal. The participation of the CIM of Alto Tamega and the CIM of the territory of Tras-os-Montes on the Portuguese side is foreseen, and on the Spanish side, the Municipality of Baixo Lima, the Municipality of A Lima, the Whole Municipality of Verin and the Municipality of Viana, which are part of the Council of Ourense, are included (fig. 3). With this option, the scale of Eurocity Chaves-Verin is significantly exceeded and the move is rather towards the creation of a new Euroregion, with its specific features.

Advantages:

✓ Creation of a space for cross-border cooperation on a regional scale in the interior of Galicia and Northern Portugal, which could become a new Euroregion;

✓ An institutional increase in weight as a result of the participation of subjects with administrative weight in the territories, will allow to improve the performance of these territories both in the national context (Portugal and Spain) and in the EU;

✓ Inclusion of Tras-os-Montes and significant parts of the autonomous region of Galicia in the processes of cross-border cooperation;

✓ Need for the development and implementation of new regional strategies for economic development that integrate the included territories, the efforts of local people and institutions to overcome similar socio-economic challenges and problems;

✓ Inclusion in the same structure of territories with a similar economic profile, which would allow strengthening the competitiveness and positioning of the cross-border space in some economic sectors such as agriculture, tourism (especially spa and rural tourism), green energy production, etc. (Eurocidade Chaves-Verin, AECT 2023).

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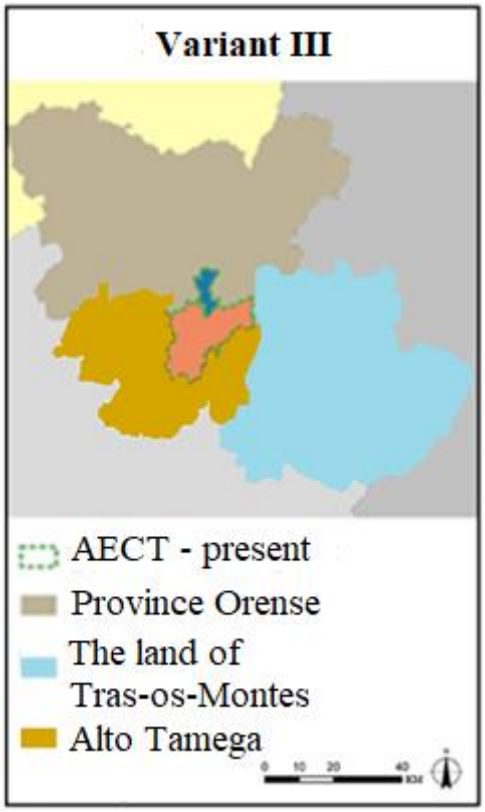


Figure 3 Variant III of territorial expansion
Source: Xunta de Galicia. (2019). Plan Estratéxico 2021-2030.

Disadvantages:

✓ The lack of experience in the cooperation between the entities that will be included may lead to problems related to cultural consolidation and joint institutional work between municipalities and municipal entities on both sides of the border;

✓ It will be necessary to create a new image and brand, since the common elements connecting Eurocitie Chaves-Verin will not be able to be shared by the newly joined territories;

✓ Occurrence of difficulties in uniting the new participants around new lines of action and developing new strategies, given the greater variety and specific features of the new territories;

✓ The emergence of an imbalance between the new entities from the two countries, since two inter-municipal communities from the Portuguese side and fewer territories from the Spanish side included in the Provincial Council will be added to Chaves and Verin;

✓ The emergence of new participants with greater socio-economic weight in the form of cities such as Ourense (Spain) and Braganza (Portugal), will take away the strategic advantage of Eurocity Chaves-Verin in the field of cross-border cooperation (Xunta de Galicia 2019).

**Conclusion**

All three options have strengths and weaknesses, and this is extremely important from the point of view of the sustainable development of the Eurocity Chaves-Verin project, as a tool for local development of the border territories with their specific features (Xunta de Galicia 2019).

In the first variant, Eurocity Chaves-Verin does not undergo significant development and retains its current institutional structure and territorial scope.

The second option considers the possible territorial expansion with the inclusion of Alto Tameta on the Portuguese side, as well as the municipality of Verín on the Spanish side. An

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extended institutional participation of the CIM of Alto Tamega and the Provincial Council of Ourense is envisaged.
The third option is more difficult to implement, because it implies a significant territorial expansion of the EGTS, which implies the inclusion of almost the entire border between Portugal and Ourense (that is, from the province of Ourense, only the territory of the municipalities of Baixu Lima, A Lima, Verin and Viana is included) . In this case, both the Provincial Council of Ourense and the CIM of Alto Tamega and Tras-os-Montes from the Portuguese side will participate.
In all three options, the area of common action is of most importance. In the case under consideration, it is the one made up of the municipalities of Verin and Chaves.
Here we can point to the different territorial scope, especially on the Galician side, considering the difference in size between the municipality of Verín and that of Chaves. The need for the Galician country to have a wider territorial dimension, equivalent to that of Portugal, is often pointed out, referring to the regional scale (Monterrey Valley). In the first years of the project, the “leap to scale” on the Galician side was not possible. Currently, however, this idea is resurfacing. More or less concrete concepts emerged, such as that of forming a “Eurodistrict” or “Euroregion” with a larger territory, usually identified with the Galician region of Verin (community of Verin) and sometimes with Portugal's Alto Tamega.
In fact, Alto Tamega is not an official name in Portugal and the space it can cover varies between different concepts. On the one hand, it forms NUTS 3, the so-called Alto Tras-os-Montes, where, in addition to Chaves, 13 other municipalities are included, their territory exceeding 8,000 km$^2$, an area that is larger than the entire province of Ourense. On the other hand, there is the Association of Municipalities of Alto Tamega, which unites 6 municipalities: Boticash, Montalegre, Ribeira de Pena, Valpasos and Villa Pouca de Aguiar.
The emerging proposal for a joint EGTS between the province of Ourense and that of Portugal's Alto Tamega, to be called “Vale do Tamega”/”Val do Tamega”, will include the Portuguese municipalities of Boticas, Chaves, Montalegre, Vila Pouca de Aguiar and Viñaish. In short, the mention of these 13, 5 or 4 Portuguese municipalities beyond Chaves as the scope of future expansion of the space currently covered by the Eurocity project undergoes variations.
This eventual expansion would greatly increase the cooperation territory (tripling, quadrupling or quintupling the area currently covered) and reaching a population that could exceed 100,000 people. The possibility of extension is provided for in the EGTC Statutes, Article 6, where it is stated that entities that have their headquarters in NUTS 2 Galicia and Northern Portugal may be admitted. It is interesting to note that they are not limited to NUTS 3 (Province of Ourense in Galicia, Alto Trás-os-Montes in Portugal), which would be more appropriate to keep the territorial scope limited to the two cities that participate in Eurocities. For this reason, a possible enlargement of the members would make the use of the term Eurocities questionable in the sense of the current Chaves-Verin bilateral relations, as well as the possibility of considering them as “cities that cross the border”. In turn, it may come into competition with the planned AECT Val do Tamega.

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# KRIPKE SEMANTICS, COMMON KNOWLEDGE, BOUNDED RATIONALITY AND AUMANN'S AGREEMENT THEOREM

**Dushko Josheski[1*], Natasha Miteva[2], Dushica Popova[3]**

*[1]Associate professor Faculty of Tourism and Business Logistics, Goce Delcev University, Stip, North Macedonia; e-mail:* dusko.josevski@ugd.edu.mk *; ORCID: 0000-0002-7771-7910*

*[2]Associate professor, Faculty of Tourism and Business Logistics, Goce Delcev University, Stip, North Macedonia,* natasa.miteva@ugd.edu.mk *;* ORCID: *0009-0004-8082-6458*

*[3]Assistant professor, Faculty of Tourism and Business Logistics, Goce Delcev University, Stip, North Macedonia, R.North Macedonia, e-mail:* dusica.saneva@ugd.edu.mk *;ORCID: 0009-0004-4750-8992*

**Corresponding author:* dusko.josevski@ugd.edu.mk

## Abstract

The first model with k-level thinking with Gaussian noise shows that small deviations for common knowledge led to "almost" common knowledge equilibria. The second model demonstrated the semantic economy idea: as agents exchange and adapt beliefs, they create shared informational value by reaching a consensus that reflects network-wide insights rather than mere individual optimization. Higher reasoning depth does not change Nash equilibria but shifts up Kantian beliefs. The shift up in Kantian beliefs suggests a greater alignment toward strategies that maximize collective welfare, rather than purely individualistic or competitive outcomes. This doesn't alter the Nash equilibrium, where players still act independently, but it emphasizes a higher baseline of cooperative or altruistic expectations among players due to more profound belief hierarchies in the reasoning process. In the third model: networked economic context where agents interact in an economic network where competitive advantage depends on the informational value generated across the network, results differ from the second example: Nash beliefs adjust based on others' best responses (shift up), while Kantian beliefs account for mutual benefit, dampening large shifts. Nash and Kantian equilibria differ when only three agents exist versus network economy.

**Keywords:** Kripke semantics, Common knowledge, Kantian equilibrium, Nash equilibrium, Agreement theorem, Bounded rationality

**JEL codes: C72, C79, D83, D84**

## 1.Introduction

In game theory it is more than well known that phenomena such as market speculations and "agree to disagree" can not be observed in equilibrium in a model of Bayesian rational agents, see Geanakoplos, J. (1989/2021). In classical game theory, or the neoclassical school of economic thought, rationality is assumed on the assumption that agents can unilaterally change their strategies, so Stalnaker(1994) applied Kripke (1963) work to game theory and showed that rationalizability is characterized with common belief in rationality, and that Nash equilibria are characterized with rationality and knowledge of the opponents belief, see Fourny, G. (2018) .But Nash concept seemed week in some ways ,too strong in others, to "yield plausible recommendations in all cases", see Stalnaker(1994). Myerson (1991), expresses doubt that any solution concept can satisfy all criteria of adequacy[1],

[1] For instance, does Nash solution concept satisfy general existence theorem? The answer is that the two concepts differ: Nash Equilibrium is a concept from non-cooperative game theory, where players (agents) make individual decisions with the goal of maximizing their own payoffs, given the actions of others. The General

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suggesting that perhaps the best we can do is to find various notions that offer a useful way "to formalize part of our intuitive criteria about how rational intelligent players might behave in a game." So we introduced the concept of Kantian equilibrium in our analysis, following Osborne,M.J., Rubinstein,A.(2023), and Roemer (2010**),** Roemer (2019).Similar to the General Existence Theorem, Kantian equilibria tend to result in Pareto-efficient outcomes since players' strategies maximize collective welfare. This parallels the goal of the General Existence Theorem by Arrow, Debreu (1954), which is to achieve efficient allocation through market equilibrium.But for the existence of equilibria: For Kantian equilibria, existence theorems are often proven using fixed-point theorems like Brouwer's or Kakutani's, similar to Nash equilibrium proofs, rather than the Walrasian conditions required by the General Existence Theorem[2]. Knowledge and interactive knowledge are central elements in economic theory. So again, this question can rational agents "agree to disagree"? see Geanakoplos (1992). Bayesian Nash equilibrium[3] implies that agents cannot agree to disagree; it implies that they cannot bet when the bet is common knowledge; and most surprising of all, it does not include speculation. So here comes no trade theorem The agreement theorem underlies an important set of results that place limits on the trades that can occur in differential information models under the common prior assumption(see Kreps, (1977); Milgrom and Stokey, (1982)).These no-trade theorems(The No-Trade Theorem is an economic theory that explains why rational agents with common knowledge and identical prior beliefs should not engage in trade purely based on the exchange of information) state, in various ways, that rational risk-averse traders cannot take opposite sides on a purely speculative bet. Common knowledge Is one of the key components of no-trade theorem. Common knowledge means that all agents not only know the available information but also know that others know this information—and they know that everyone else knows that everyone knows, and so on (infinite recursion). In the context of the No-Trade Theorem, if there's common knowledge about asset values, market conditions, or other relevant factors, no agent can gain a unique informational advantage. The theorem assumes that agents start with identical prior beliefs about the state of the world and update these beliefs in a Bayesian manner upon receiving new information. If agents start with the same beliefs and interpret information in the same way, any information revealed by one agent's desire to trade will immediately lead others to adjust their beliefs, again removing the incentive for trade. Rubinstein (2021) proposes 4 models of bounded rationality: Limited ability to solve a set of propositions, Reducing the complexity of strategies, Belief formation on the basis of a small sample; Diversified views of the world. In this paper we include Luce choice axiom Luce, R. D. (1959/2005) with bounded rationality which is rationality in a sense of Selten (1998).,Simon (1957). These were all motivations for writing this paper. Kripke semantics was used in modeling to

Existence Theorem pertains to competitive markets and the existence of a general equilibrium in an economy where prices adjust so that supply equals demand across all markets, see Arrow, Debreu (1954); McKenzie, (1954).

[2] Kantian equilibrium does not rely on prices to coordinate agents' actions; instead, it relies on a shared cooperative principle. Kantian equilibrium does not involve clearing of markets as in a Walrasian equilibrium, which is central to the General Existence Theorem. Kantian equilibrium can apply to cooperative settings where players are not necessarily price-takers, which is a core assumption of the General Existence Theorem unlike Nash equilibria.

[3] Common knowledge of rationality and optimization

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represents possible worlds and accessibility, and knowledge representation (For any agent $i$ in world $w$, the agent knows $p$ if $p$ holds in all worlds accessible to $i$ from $w$).Bounded rationality was represented through k-level thinking—where each agent reasons only up to a finite depth, limiting how much they can consider other agents' potential reasoning. Aumann's Agreement theorem when applied to agents in a Kripke frame, common knowledge is achieved through repeated information exchanges. Cognitive Hierarchy Theory describes agents who operate at different levels of reasoning (or depth) in our models K-Level thinking captures this by allowing each agent to compute beliefs based on others' beliefs iteratively up to their reasoning depth. And semantic economy goals are achieved through cooperation, knowledge-sharing, and creating shared understandings.

## 2.Kripke semantics,classical and intuitionistic Kripke model, and Zermelo-Fraenkel set theory

Kripke semantics is a formal system used to model modal logic—logics that involve modalities like necessity (□) and possibility (◊). These modalities express statements about what is necessarily true or possibly true, often in the context of knowledge, belief, or time. Kripke semantics provides a structure to interpret these modalities using possible worlds. The concept of Kripke model is due to Kripke (1959), Kripke(1962),Kripke (1963),Kripke (1965).

*Definition 1* A classical Kripke model (due to Ilik et al.(2010) is given by a quintuple $(K, \leq, D, \Vdash_s, \Vdash_\perp)$, $K$ inhabited, such that $(K, \leq)$is a poset[4]of possible worlds,$D$ is the domain function assigning sets to the elements of K such that:

*Well-formed formula 1*

$$\forall w, w' \in K, (w \leq w' \Rightarrow D(w) \subseteq D(w'))$$

i.e., $D$ is monotone. Let the language be extended with constant symbols for each element of $\mathcal{D} := \cup \{D(w) : w \in K\}$.And,$(-): (-) \Vdash_s$ is a binary relation of "strong refutation" between worlds and atomic sentences in the extended language such that:

*Well-formed formula 2*

$$w: X(d_1, \ldots, d_n) \Vdash_s \Rightarrow d_i \in D(w), \forall i \in \{1, \ldots, n\}$$
$$w: X(d_1, \ldots, d_n) \Vdash_s, w \leq w': X(d_1, .., d_n) \Vdash_s$$

The relation $\Vdash$ is called the *satisfaction relation*, *evaluation*, or *forcing relation*[5] Given a model $M$ (usually a transitive model of ZFC-Zermelo–Fraenkel set theory,see Zermelo (1930)), any poset $(P, <)$in it is a notion of forcing and its elements forcing conditions. A $G$ in $M$ is said to be generic if it is a filter and any dense set in $P$ that belongs to $M$ has a nonempty intersection with $G$. There's a theorem that states that for a transitive model $M$ of ZFC and a generic set $G \subset$there's a transitive model $M[G]$ of ZFC that extends $M$ and, associated with that, we define a forcing relation $\Vdash$ where some element $p \in G$ forces a formula $\varphi$ iff $M[G] \vDash \varphi$, i.e., $(\exists p \in G) p \Vdash \varphi$ if $\varphi$ is valid in $M[G]$, this will happen for every generic $G$ if $\varphi$ is said to be in the forcing language.

[4] A partially ordered set (normally, poset) is a set, $L$, together with a relation, $\leq$, that obeys, $\forall\ a, b, c \in L$: (reflexivity) $a \leq a$; (anti-symmetry) if $a \leq b$ and $b \leq a$ then $a = b$; and (transitivity) if $a \leq b$ and $b \leq c$ then $a \leq c$. The relation $\leq$ is called a partial order on $L$. See, Dickson (2007).

[5] In mathematics or set theory forcing is a technique for proving consistency and independence results.

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*Definition 2* For $\mathbb{P} \in V$ a poset and $p \in \mathbb{P}$,we say $p$ *forces* $\varphi$ and write $p \Vdash \varphi$ iffor every generic over $V$ filter $X$ containing, $p$, $V[X] = \varphi$.

*Definition 3* The relation $(-)\colon (-) \Vdash_s$ of strong refutation is extended to the relation between worlds $w$ and composite sentences $A$ in the extended language with constants in $D(w)$, inductively, together with the two new relations. A sentence $A$ is forced in the world $w$ (notation $w : A \Vdash$) if any world $w' \geq w$,which strongly refutes $A$, is exploding. A sentence $A$ is forced in the world $w$ (notation $w : A \Vdash$) if any world $w' \geq w$,which forces $A$, is exploding

*Well-formed formula 3*

$$w\colon A \wedge B \Vdash_s \ if\ w\colon A \Vdash \bigvee w\colon B \Vdash$$

$$w\colon A \vee B \Vdash_s \ if\ w\colon A \Vdash \bigwedge w\colon B \Vdash$$

$$w\colon A \to B \Vdash_s \ if\ w\colon \Vdash A \bigwedge w\colon B \Vdash$$

$$w\colon \forall x A(x) if\ w\colon A(d) \Vdash for\ some\ d \in D(w)$$

$$w\colon \exists x.\, A(x) \Vdash_s, \forall\, w' \geq w \wedge d \in D(w'), w'\colon A(d) \Vdash;$$

$$\bot \text{ is always srongly refuted}$$

$$\top \text{ is never strongly refuted}$$

The Zermelo-Fraenkel axioms are the basis for Zermelo-Fraenkel set theory.

1.*Axiom of Extensionality*: If $X$ and $Y$ have the same elements, then $X = Y$.

*Well-formed formula 4*

$$\forall u(u \in X \equiv u \in Y) \Rightarrow X = Y$$

2. *Axiom of the Unordered Pair* (axiom of pairing): For any $a$ and $b$ there exists a set $\{a, b\}$ that contains exactly $a$ and $b$.

*Well-formed formula 5*

$$\forall a \forall b \exists c \forall x \left( x \in c \equiv \left( x = a \bigvee x = b \right) \right)$$

3. *Axiom of subsets(Axiom of Separation or Axiom of Comprehension*): If $\varphi$ is a property (with parameter $p$), then for any $X$ and $p$ there exists a set $Y = \{u \in X\colon \varphi(u, p)\}$ that contains all those that have the property $\varphi$ .

4. *Axiom of the sum of set (Axiom of Union):* For any $X$ there exists a set $Y = \bigcup X$, the union of all elements of $X$.

*Well-formed formula 6*

$$\forall X \exists T \forall u(u \in Y \equiv \exists z(z \in X \bigwedge u \in z))$$

5. *Axiom of the power set*: For any $X$ there exists a set $Y = P(X)$, the set of all subsets of $X$.

*Well-formed formula 7*

$$\forall X \exists Y \forall u(u \in Y \equiv u \subseteq X)$$

6. *Axiom of Infinity*: There exists an infinite set.

*Well-formed formula 8*

$$\exists S \left[ \emptyset \in S \bigwedge (\forall x \in S) \left[ x \bigcup \{x\} \in S \right] \right]$$

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7. *Axiom of Replacement*: If $F$ is a function, then for any $X$ there exists a set $Y = F[X] = \{F(x): x\ in\ X\}$.

*Well-formed formula 9*

$$\forall x \forall y \forall z \left[\varphi(x,y,p) \bigwedge \varphi(x,z,p) \Rightarrow y = z\right] \Rightarrow \forall X \exists Y \forall y [y \in Y \equiv (\exists x \in X)\varphi(x,y,p)]$$

8. *Axiom of Foundation*: Every nonempty set has an ∈ in -minimal element.

*Well-formed formula 10*

$$\forall S \left[S \neq \emptyset \Rightarrow (\exists x \in S\ ) S \bigcap x = \emptyset\ \right]$$

9. *Axiom of Choice*: Every family of nonempty sets has a choice function.

*Well-formed formula 11*

$$\forall x \in a \exists A(x,y) \Rightarrow \exists y \forall x \in a A\big(x, y(x)\big)$$

A *Kripke model* MM for a propositional logical system ,classical, intuitionistic, or modal $\Lambda$ is a pair $(\mathcal{F}, V)$, where $\mathcal{F} := (W, R)$ is a Kripke frame, and $V$ is a function that takes each atomic formula of $\Lambda$ to a subset of $W$. If $w \in V(p)$, we say that $p$ is *true* at world $w$. We say that $M$ is a $\Lambda$-model *based on* the frame $\mathcal{F}$ if $M = (\mathcal{F}, V)$ is a model for the logic $\Lambda$. Since the well-formed formulas (wff's) of $\Lambda$ are uniquely readable, $V$ may be inductively extended so it is defined on all wff's. The following are some examples:

*Well-formed formula 12*

in classical propositional logic:$PL_c V(A \to B) := V(A)^c \cup V(B); S^c := W - S$

in the model propositional logic:

*Well-formed formula 13*

$$K, V(\Box A) := V(A)^{\Box}, where\ S^{\Box} := \{u| \uparrow u \subseteq S\}, \wedge \uparrow u := \{w | uRw\}$$

In Propositional Intuitionistic Logic:

*Well-formed formula 14*

$$P_i V(A \to B) := \big(V(A) - V(B)\big)^{\#}, S^{\#} := (\downarrow S)^c, \wedge \downarrow S := \{u | uRw, w \in S\ \}$$

About Kripke semantics, A Kripke model is a triple$\mathcal{M} = \langle W, R, v \rangle$, where $W$ a non-empty set of possible worlds, $R$ is a preorder (i.e., a reflexive and transitive relation) on $W$, and $v: Var \times W \to \{0,1\}$ is the *variable valuation function*. The function $v$ is required to be monotonic w.r.t. $R$: if $xRy$, then $v(p,x) \leq v(p,y)\ \forall\ p \in Var$. In other words, if $v(p,x) = 1$ and $xRy$, then $v(p,y) = 1$. By $R(x)$ we denote the set $\{y \mid xRy\}$. In different worlds, different formulae are considered true. If formula $A$ is true in world $x$ of $\mathcal{M}$, we write $M, x \Vdash A$; is called the forcing relation and defined as follows:

*Well-formed formula 15*

$$\mathcal{M}, x \nVdash \bot, falsity\ is\ never\ true$$
$$\mathcal{M}: x \Vdash p, iff\ v(p,x) = 1$$
$$\mathcal{M}: x \Vdash A \wedge B\ iff\ \mathcal{M}, x \Vdash A, \mathcal{M}, x \Vdash B\ (conjuction)$$
$$\mathcal{M}: x \Vdash A \vee B\ iff\ \mathcal{M}, x \Vdash A, \mathcal{M}, x \Vdash B$$
$$\mathcal{M}: x \Vdash A \to B\ iff\ \forall y \in R(x), \mathcal{M}, y \nVdash A, \wedge\ \mathcal{M}, y \nVdash B$$

This definition is designed to preserve monotonicity of forcing: if $\mathcal{M}, x \Vdash A$ and $xRy$, then $M, y \Vdash A$. If the Kripke model has only one world $(|W| = 1)$, then it is a model

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for classical propositional logic. Intuitionistic propositional logic is sound w.r.t. Kripke semantics:

*Theorem 1* if $\vdash_{Int} A$,then for every Kripke model $\mathcal{M} = \langle W, R, v\rangle$ and for every possible world $x \in W$ of this model $\mathcal{M}, x \Vdash A$.

*Proof:* in order to prove soundness, one needs to prove that if $A$ is an axiomof Int,then $\mathcal{M}, x \Vdash A$ and second if $\mathcal{M}, x \Vdash A \to B \Rightarrow \mathcal{M}, x \Vdash B$.The second part is easy: If $x \Vdash A \to B$.then for every world $y \in R(x)$ we have either $y \Vdash A$ or $y \Vdash B$.Since $y = x$by reflexivity of $R$ ,then given $x \Vdash A$,we obtain $x \Vdash B$. Here, we need to prove $x \Vdash A \to (B \to C) \to \big((A \to B) \to (A \to C)\big)$.In order to establish that a formula of the form $E \to F$ is true in $x$ ,one needs o check that $\forall y \in R(x)$ if $y \Vdash E$, then $y \Vdash F$.Again ,lets consider arbitrary $z \in R(y)$, such that $z \Vdash A \to B$.On this turn we need to show that $z \Vdash A \to C$. Let $w$ be a world from $R(z)$, such that $w \Vdash A$ and finally we need $w \Vdash C$. So, now:

*Well-formed formula 16*

$$\begin{array}{c} w \Vdash A \\ \uparrow \\ z \Vdash A \to B \\ \uparrow \\ y \Vdash A \to (B \to C) \\ \uparrow \\ x \end{array}$$

By monotonicity, since $yRw, zRw$ , the formulae $A \to (B \to C)$ and $A \to B$ are also true in $w$. Since modus ponens[6] is applicable for $\Vdash$ ,we have $w \Vdash B \to C$ ,$w \Vdash B, w \Vdash C$ which is our goal ■ .

Now, about Kripke *completeness theorem*.

*Theorem 2* If a formula is true in every possible world of any Kripke model, then it is derivable in Int.

We proceed, let $A$ be the formula such that $\nvdash_{Int} A$. Now, a countermodel for $A$, that is model $\mathcal{M}$ that contains a world $x$, such that $\mathcal{M}, x \nVdash A$.This will be the canonical model for Int.denoted by $\mathcal{M}_0$.

*Definition 4* A set $\Gamma$ of formulae is called disjunctive theory[7]:

1. $\Gamma$ is deductively closed, i.e.$\Gamma \vdash_{Int} B$ , so $B \in \Gamma$
2. $\Gamma$ is consistent i.e. $\Gamma \nvdash_{Int} \bot$
3. $\Gamma$ is disjunctive i.e. $\Gamma \nvdash_{Int} A \vee B, \Gamma \vdash_{Int} A \wedge \ \Gamma \vdash_{Int} B$

*Definition 5* The *canonical model* for Int is the model $\mathcal{M}_0 = \langle W_0, R_0, v_0\rangle$ where:$W_0$ is the set of all disjunctive theories,$R_0$ is the subset relation $\Gamma R_0 \Gamma_2 \Leftrightarrow \Gamma_1 \subseteq \Gamma_2$,$v_0$ is defined as follows: $v_0(p, \Gamma) = 1 \Leftrightarrow p \in \Gamma$.

*Lemma 1* Let $\mathcal{M}_0, \Gamma \Vdash B \Leftrightarrow B \in \Gamma$

This is called *Main Semantic Lemma*. Or the Main Semantic Lemma states:

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[6] It can be summarized as "P implies Q. P is true. Therefore, Q must also be true." Or $\frac{P \to Q, \quad P}{Q}$ see Stone (1996).

[7] Disjunctive theory typically refers to a theory or logical framework that uses disjunctions (logical OR statements) as a central component. The disjunction is a fundamental logical connective in both classical and non-classical logics, and a disjunctive theory would emphasize the role of such disjunctions in reasoning or inference.

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1. If a formula $\phi$ is provable in the modal logic i.e. $\vdash \phi$ , then $\phi$ is true in all models i.e. $M \vDash \phi$.
2. If $\phi$ is true in all models, then $\phi$ is provable i.e. $M \vDash \phi \; implies \vdash \phi.$

For this part of the paper see more in https://homepage.mi-ras.ru/~sk/lehre/penn2017/ Logic II (LGIC 320 / MATH 571) (University of Pennsylvania, Spring 2017).

*Lemma 2* This holds in classical Kripke semantics

1. $w: \Vdash A \Leftrightarrow \neg A \Vdash_s$
2. $w: A \Vdash \Leftrightarrow w: \Vdash \neg A$
3. $w: \neg A \Vdash \Leftrightarrow w: \Vdash A$
4. $w: \neg A \Vdash \Leftrightarrow w: \neg A \Vdash_s$
5. $w: \Vdash A \Leftrightarrow w: \Vdash \neg\neg A$
6. $w: A \Vdash \Leftrightarrow w: \Vdash \neg\neg A \Vdash$
7. $w: \neg A \Vdash_s \Leftrightarrow w: \Vdash \neg\neg A \Vdash \Leftrightarrow w: \Vdash A$

*Proof*: under number 1 obvious because $w: \bot \Vdash$; under second it is obvious because: $w: \Vdash A \to B \Leftrightarrow \forall w' \geq w, w': \Vdash A \Rightarrow w': \Vdash B$, $w: \Vdash A \wedge B \Leftrightarrow w: \Vdash A \wedge w: \Vdash B$, $w: \Vdash A \vee B \Leftarrow w: \Vdash A \vee w: \Vdash A(d)$, $w: \Vdash A \vee B \Leftarrow w: \Vdash A \vee w: \Vdash B$, $w: \Vdash \exists x A(x) \Leftarrow \forall d \in D(w), w: \Vdash A(d)$■, see Ilik et al.(2010).

So, now in turn basic elements of Kripke frame can be simply written as:

*Well-formed formula 17*

$$\mathcal{F} = (W, R)$$

$W$ is non-empty set of worlds,$R \subseteq W \times W$ is a **binary accessibility relation** on $W$, which determines which worlds are accessible from other worlds. $wRw'$ means that the world $w'$ is accessible from world $w$.A Kripke model $\mathcal{M}$ extends the frame:

*Well-formed formula 18*

$$\mathcal{M} = (W, R, v)$$

$W, R$ are the same as in Kripke frame. $V: Prop \to 2^W$is a valuation function, where Prop is a set of propositional variables[8] and $2^W$ is the power set of $W$ . For each propositional variable $p \in Prop, V(p) \subseteq W$.

## 2.1 Truth in Kripke Models

The truth of a formula of a world $w \in W$ in a Kripke model $\mathcal{M} = (W, R, v)$ is defined inductively. Let $\varphi$ represents formula in modal logic. Here, we define $\mathcal{M}, w \vDash \varphi$ to mean that $\varphi$ is true in model $\mathcal{M}$ at world $w$. The truth conditions are as follows:

1. For a propositional variable $p$:

*Well-formed formula 19*

$$\mathcal{M}, w \vDash p, if \; and \; only \; if \; w \in V(p)$$

[8] A propositional variable in propositional logic is a countable infinite set of symbols denoted by $V$,representing unknown truth values that can be either true or false in logical expressions.

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That is $p$ is true at world $w$ if $w$ is in the set of worlds where $p$ is true.

2. Negation:

*Well-formed formula 20*

$$\mathcal{M}, w \vDash \neg\varphi \; if \; and \; only \; if \; \mathcal{M}, w \nvDash \varphi$$

The $\neg\varphi$ is true at $w$ if $\varphi$ is not true at $w$.

3. Conjunction

*Well-formed formula 21*

$$\varphi \wedge \psi$$
$$\mathcal{M}, w \vDash \varphi \wedge \psi \; if \; and \; only \; if \; \mathcal{M}, w \vDash \varphi, \mathcal{M}, w \vDash \psi$$

That is $\varphi \wedge \psi$ is true at $w$ if both $\psi$ and $\varphi$ are true at $w$.

4. Modal operators

For the necessity operator $\Box\varphi$ :

*Well-formed formula 22*

$$\mathcal{M}, w \vDash \Box\varphi \; if \; and \; only \; if \; \forall w' \in W \, , (wRw' \Rightarrow \mathcal{M}, w' \vDash \varphi \,)$$

That is $\Box\varphi$ is true at $w$ if $\varphi$ is true in all worlds $w'$ that are accessible from $w$.

For the possibility operator $\diamond \varphi$:

*Well-formed formula 23*

$\mathcal{M}, w \vDash \diamond \varphi$ if and only if $\exists w' \in W \, , (wRw \wedge \mathcal{M}, v \vDash \varphi)$

That is, $\diamond \varphi$ is true at $w$ if $\varphi$ is true in at least one world, $w'$ that is accessible from $w$.

### 2.2 Properties of the Accessibility Relation $\boldsymbol{R}$

Different modal logics impose different conditions on the accessibility relation $R$. Some of the key properties are:

1. **Reflexivity**: $\forall w \in W, wRw$ This means that each world can access itself. Reflexivity corresponds to **knowledge** logic, where if something is true in a world, the agent knows that it is true.
2. **Symmetry:** $\forall w, w', w'' \in W \, , wRw' \Rightarrow w'Rw$.This means that if $w'$ is accessible from $w$,is also accessible from $w'$ .Symmetry is relevant in **shared knowledge**.
3. **Transitivity**: $\forall w, w', w'' \in W \, , (wRw' \wedge w'Rw'') \Rightarrow wRw''$.This means that if $w'$ is accessible from $w$ , and $w''$ is accessible from $w$. Transitivity is often epistemic logic.
4. **Euclidean**: $\forall w, w', w'' \in W, (wRw' \wedge wRw'') \Rightarrow w'Rw''$. This is another condition in epistemic logic.

### 2.3 Validity and Satisfaction in Kripke Models

A formula $\varphi$ in a Kripke model $\mathcal{M} = (W, R, v)$ is valid if :

*Well-formed formula 24*

$$\mathcal{M}, w \vDash \varphi, \forall w \in W$$

This is, $\varphi$ is true in all possible worlds of the model. A formula $\varphi$ is valid in Kripke frame $\mathcal{F} = (W, r)$ if it is trus in every Kripke model based on that frame.

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## 3.Common knowledge

First, we will outline Geanakopolos (1992) model of common knowledge. Model outline is as follows: Let there be a set $N$ of agents, where each agent $i \in N$ holds information. Let the state of the world be represented by $\Omega$, which is a set of possible states $\omega \in \Omega$. Each agent $i$ is associated with an information partition $\mathcal{P}_i$ which is a partition of $\Omega$ . This partition represents the agent's knowledge, i.e., what states of the world the agent can distinguish. If two states $\omega$, and $\omega'$ are in the same element of $\mathcal{P}_i$ , then agent $i$ cannot distinguish between these two states. Now, knowledge can be represented as set theoretic concept, for each agent $i$, the information partition $\mathcal{P}_i$ induces a **knowledge operator** $K_i$, where for any event $E \subseteq \Omega, K_i(E)$ is the set of states in which agent $i$ knows that $E$ has occurred. Formally we define this as:

*equation 1*

$$K_i(E) = \{\omega \in \Omega | \ \forall \omega' \in \mathcal{P}_i(\omega), \omega' \in E \ \}$$

In words agent $i$ knows that event $E$ occurs if, at state $\omega$ , all the states indistinguishable from $\omega$ i.e. those in same partition cell are also in $E$. Common knowledge among all agents can be derived using set theory.

*Definition 6* We can define **common knowledge** of an event $E$ as the event where everyone knows $E$, everyone knows that everyone knows $E$, and so on ad infinitum.
This is captured by the common knowledge operator $K^*(E)$ which is the intersection of all iterated knowledge operators:

*equation 2*

$$K^*(E) = \bigcap_{n=1}^{\infty} \left( \bigcap_{i_1, i_2, \ldots, i_n \in N} K_{i_1}, K_{i_2}, \ldots, K_{i_n}(E) \right)$$

This intersection represents the set of states where $E$ is common knowledge—i.e., where all agents know $E$, all agents know that all agents know $E$, and so on. Geanakoplos's work often involves Bayesian updating, where agents revise their beliefs based on new information. In a set-theoretic framework, we can model this as follows. Each agent $i$ has a prior belief which is represented by probability distribution $\mu_i \in \Omega$. When agent $i$ observes an event $E$, they update their belief using Bayes' rule. The updated belief $\mu_i(E|\omega)$ is defined as :

*equation 3*

$$\mu_i(E|\omega) = \frac{\mu_i\big(E \cap \mathcal{P}_i(\omega)\big)}{\mu_i(\mathcal{P}_i|\omega)}$$

### 3.1 Common knowledge in Kripke frame

Kripke frame with valuation function is:

*equation 4*

$$M = \{W, (R_i)_{i \in N}, V\}$$

$V: Prop \to 2^W$ is a valuation function that assigns a set of worlds to each proposition $p \in Prop, \forall p, V(p) \subseteq W$ set of worlds where $p \to true$. Knowledge operator that we should define is $K_i$ for each agent $i$.Now, given a Kripke model $M = \{W, (R_i)_{i \in N}, V\}$ and a world $w \in W$ ,agent $i$ knows $p$ at world $w$, if for $\forall w' \Rightarrow wR_iw'$ i.e. $w'$ is possible according to agent $i's$ knowledge in world $w$,$p$ holds in $w'$ or formally:

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*Well-formed formula 25*

$$M, w \vDash K_i p \Leftrightarrow \forall w' \in W, (wR, w') \Rightarrow M, w' \vDash p$$

This means that agent $i$ knows $p$ at world $w$ if in all worlds they consider possible $p \rightarrow true$.We can define common knowledge[9] here by using iterated knowledge operator over the agents. Now, let $K_i$ denote the knowledge operator for agent $i$ and let $N$ be the set of all agents. The common knowledge operator can be defined recursively:

*equation 5*

$$C_p = \bigcap_{n=1}^{\infty} K_1, K_2, .., K_n p$$

Alternatively, we can define common knowledge by creating a new relation $R_C$called common knowledge relation, which is transitive closure of the union of the individual relations $R_i$:

*equation 6*

$$R_C = \bigcap_{i \in N} R_i$$

Then the common knowledge operator $C$ can be defined as:

*Well-formed formula 26*

$$M, w \vDash C_p \Leftrightarrow \forall w' \in W\ , (wR_C w') \Rightarrow M, w' \vDash p$$

This means that common knowledge of $p$ hold at world $w$ if, $\forall w'$ worlds that are reachable through the common knowledge relation $R_C$, $p$ holds:

### 3.2 Set-theoretic model of common knowledge in Kripke semantics

The set of all possible worlds $W$ is forming the basic structure. The accessibility relations $R_i \subseteq W \times W$ represents the knowledge of each agent,$i$.For a proposition $p$, we define set

*equation 7*

$$[\![p]\!] = \{w \in W \mid M, w \vDash p\}$$

The common knowledge of $p$ is the set of worlds where $p$ holds in all possible worlds that are reachable through the common knowledge relation $R_C$:

*equation 8*

$$[\![C_p]\!] = \{w \in W \mid \forall w' \in W, (wR_C w') \Rightarrow w' \in [\![p]\!]\}$$

Here the set of worlds $p$ is a common knowledge,i.e. everyone knows $p$ ,everyone knows that everyone knows $p$,and so on. Common knowledge has several important properties, especially in Kripke semantics:

1. **Monotonicity**: if $p$ is common knowledge, and $p \Rightarrow q$,then $q$ is common knowledge
2. **Fixed Point**: Common knowledge of a proposition is a fixed point in the knowledge structure. Once a proposition becomes common knowledge, it remains so.

[9] A very basic assumption of studies in game theory is that the game is common knowledge, see Rubinstein (1989).Situations without common knowledge are labeled as games with incomplete information see Harsanyi (1967) part I, Harsanyi (1968)part II, Harsanyi (1968)part III.

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### 3.3 Iterated knowledge

Common knowledge can als0 be viewed as limit of iterated knowledge. First, we will define **iterated knowledge operators** $K^p$,for $n \geq 1$ as follows:

*equation 9*

$$K^1 p = \bigwedge_{i \in N} K_i p$$

$$K^2 p = \bigwedge_{i \in N} K_i K^1 p$$

$$K^3 p = \bigwedge_{i \in N} K_i K^2 p$$

$K^1 p$ everyone knows $p$, $K^2 p$ everyone knows that everyone knows $p$, $K^3 p$ everyone knows that everyone knows that everyone knows $p$. So common knowledge is the limit of the process:

*equation 10*

$$C_P = \lim_{n \to \infty} K_P^n$$

The knowledge operator $K_i$ for agent $i$ can be represented as set operation:

*equation 11*

$$K_i[\![p]\!] = \{w \in W \mid \forall w' \in W, (wR_i w') \Rightarrow w' \in [\![p]\!]\}$$

The set contains all worlds where agent $i$ knows that $p$ is true. Common knowledge can be defined as intersection of iterated knowledge sets. The set of worlds where $p$ is common knowledge is the fixed point of the iterated knowledge process:

*equation 12*

$$[\![C_P]\!] = \bigcap_{n=1}^{\infty} K^n [\![p]\!]$$

In formal logic, **common knowledge** is often described as the **fixed point** of a knowledge process. The **fixed-point theorem** states that common knowledge is the smallest set that satisfies the property of being known by all agents at all iterations. Mathematically, this can be expressed as:

*equation 13*

$$[\![C_P]\!] = \{w \in W \mid w \in K_i([\![C_P]\!]) \forall i \in N\}$$

### 3.4 Standard model of knowledge as in Hintikka (1962) per Rubinstein (1998)

An information structure is $(\Omega, P)$ ,where $\Omega$ is a set of states. It is a “full description of world” or at least relevant facts about the world. The second component is a function $P$ that assigns each state $\omega$ a non-empty subset of states, $P(\omega)$. The assumption that $P(\omega) \neq \emptyset$ means that the decision maker can not be so “wrong” as to exclude all possible states as being feasible, see Rubinstein(1998). Three properties of information structures usually associated with the term rationality are:

*Property 1* $\omega \in P(\omega)$

This property expresses the condition that the decision maker never excludes the true state from the set of feasible states. This property ensures that each state $\omega \in \Omega$ belongs to its own information set $P(\omega)$. Hence, for each $\omega$, there exists a set $\exists P(\omega)$

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that contains $\omega$. This is the **truthfulness** condition: the agent knows the true state is part of their information set.

*Property 2* if $\omega' \in P(\omega) \Rightarrow P(\omega') \subseteq P(\omega)$
So, it is not possible for a decision maker who satisfies previous property to hold the view that $\omega' \in P(\omega)$,despite there beinga state $z$, so that $z \in P(\omega')$ and $z \notin P(\omega)$.Then, at $\omega$ a rational decision maker could consider that : the state $z$ is excluded and the state $\omega'$ one will not exclude $z$.Thus it must be that state is not $\omega'$. This contradicts assumption that $\omega' \in P(\omega)$. This property implies **positive introspection**, meaning that if the agent considers $\omega'$ possible when the true state is $\omega$, then their information at state $\omega'$cannot reveal more information than what they already knew at $\omega$. Formally, the information set $P(\omega')$ at $\omega$must be a subset of $P(\omega)$.

*Property 3* if $\omega' \in P(\omega) \Rightarrow P(\omega') \supseteq P(\omega)$
If an information structure satisfies propositions 1,3 also satisfies 2. And, if $\omega' \in \mathrm{P}(\omega)$ then by proposition 3 $\mathrm{P}(\omega') \supseteq \mathrm{P}(\omega)$, by proposition1 $\omega \in P(\omega)$,and thus $\omega' \in \mathrm{P}(\omega)$, which by proposition 3 implies that $\mathrm{P}(\omega') \supseteq \mathrm{P}(\omega)$. This property implies **negative introspection**, meaning that if the agent considers $\omega$possible when the true state is $\omega$, then the information set $P(\omega')$ must reveal at least as much information as $P(\omega)$. Formally, the information set $P(\omega')$ must contain $P(\omega)$.

*Proposition 1* An information structure $\Omega, P$ is partitional if and only if it satisfies Properties 1,2,3.
*Proof*:

1.**Property 1 (Truthfulness):** $\omega \in P(\omega)$, meaning that the true state $\omega$ belongs to the set of states that the agent considers possible, denoted by $P(\omega)$.

2.**Property 2 (Positive introspection):** If $\omega' \in P(\omega)$ then $P(\omega') \subseteq P(\omega)P$, meaning that if the agent considers $\omega'$possible at state $\omega$, then the agent's information set at $\omega$ is a subset of the information set at $\omega$.
3. **Property 3 (Negative Introspection):** If $\omega' \in P$ then $P(\omega') \supseteq P(\omega)$, meaning that if the agent considers $\omega'$ possible at state $\omega$, then the information set at $\omega$contains the information set at $\omega$.

*Definition 7* A **partitional information structure** means that: The information structure is represented as a **partition** of the set $\Omega$, meaning that each state $\omega \in \Omega$ belongs to exactly one element of the partition $P(\omega)$. The partition elements are **mutually exclusive** and **exhaustive** subsets of $\Omega$. Each partition element represents the set of states that are indistinguishable to the agent in that state.

*If we combine properties 2 and 3 :* $P(\omega') \subseteq P(\omega), P(\omega') \supseteq P(\omega) \Rightarrow P(\omega') = P(\omega)$. This means that for any two states $\omega, \omega' \in \Omega$, if $\omega' \in P(\omega$, then $P(\omega') = P(\omega)$, implying that all states that are in the same information set are indistinguishable from each other. This satisfies the condition that the information sets form a **partition** of $\Omega$, where each state belongs to exactly one partition element.Since the partition elements are mutually exclusive and exhaustive subsets of $\Omega$, we conclude that $P$ is a partition.■
Formally in Kripke logic:

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In Kripke logic, the **truthfulness** property states that if agent iii knows a proposition $\varphi$, then $\varphi$ must hold in the actual world.

*Well-formed formula 27*

$$K_i\varphi \Longrightarrow \varphi \Rightarrow \forall w \in W\ , if\ w \vDash K_i\varphi \rightarrow w \vDash \varphi$$

In Kripke logic **positive introspection** can be presented as :

*Well-formed formula 28*

$$K_i\varphi \Longrightarrow K_iK_i\varphi$$

This states that if agent $i$ knows $\varphi$, then agent $i$ also knows that they know $\varphi$.

In Kripke logic, **negative introspection** can be expressed as:

*Well-formed formula 29*

$$\neg K_i\varphi \Rightarrow K_i\neg K_i\varphi$$

This means that if agent iii does not know $\varphi$, then agent $i$ knows that they do not know $\varphi$.Common knowledge operator can be defined as follows:

*Well-formed formula 30*

$$CK(p) \Leftrightarrow \forall_i, K_i(p) \wedge \forall_i, K_i\left(KK\big(KK(p)\big)\right) \dots$$

This can also be modeled with fixed point logic[10] where common knowledge can be reached:

*Well-formed formula 31*

$$CK(p) \Leftrightarrow K_1(p) \wedge K_2(p) \wedge \dots\dots \wedge K_n(p) \wedge K_1\big(KK(p)\big) \wedge K_2\big(KK(p)\big) \dots$$

### 3.5 Back to Kripke's S5 system

*Theorem 3* Kripke's S5 system: $N, \Omega, \{T_i\} \in N$ is a knowledge space. And $A \in 2^{\Omega}$ is an event. Where, $N$ is a set of players, $A$ is a finite set of actions,$\Omega$ is the space of the states of the world. We will assume here that $\Omega$ is finite.$T_i$ is the space of possible types of player $i$.And, $t_i: \Omega \rightarrow T_i$ is player *i*'s private signal or type. Information partitions is :$P_i(\omega) = \{\omega' : t_i(\omega') = t_i(\omega)\}$, that is $P_i(\omega)$ is the set of states of the world for which player $i$ has the same type as he/she does in $\omega$. And,$\omega_i \in P_i(\omega)$ ,the set $\{P_i(\omega)\}_{\omega\in\Omega}$is easily seen to be a partition $\Omega$, and s called i's information partition. A knowledge space can thus be given as:$(N, \Omega, \{P_i\} \in N)$,see Tamuz (2024).

1. $K_i\Omega = \Omega$ A player knows that some state of the world has occurred. And given $K_iA$ a set of states of world in which $i$ knows $A$ and $A \in 2^{\Omega}$:

*equation 14*

$$K_iA = \{\omega : P(\omega) \subseteq A\} \equiv K_iA = \bigcup\{\omega : P(\omega) \subseteq A\}$$

2. $K_iA \cap K_iB = K_i(A \cap B)$. A player knows $A$ and a player knows $B$ if and only if he knows $A$ and $B$.

[10] Consider the following iterative function representing mutual knowledge up to depth $k$: $K^k(p) = K_1\big(K^{k-1}(p)\big) \wedge K_2\big(K^{k-1}(p)\big)$, where $K^0(p) = p; K^1(p) = K_1(p) \wedge K_2(p) \dots \wedge K_n(p), K^k(p), for\ k >$ 1 represents each agent knowing up to depth $k$ that $p$ holds. The process of iterating this mutual knowledge level $K^k(p)$ will converge at a fixed point: $CK(p) = \lim_{(k\rightarrow\infty)} K^k(p)$.

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3. Axiom of knowledge:$K_iA \subseteq A$ a player knows $A$ then $A$ has indeed occurred.
4. Axiom of positive introspection: $K_iK_iA = K_iA$.If a player knows $A$ then he/she knows that he/she knows $A$.
5. Axiom of negative introspection: $(K_iA)^c = K_i((K_iA)^c)$.If a player does not know $A$ then she knows that she does not know $A$.

*Proof*:

1. This follows from the definition
2. $K_iA \cap K_iB = \{\omega: P_i(\omega) \subseteq A\} \cap \{\omega: P_i(\omega) \subseteq B = \{\omega: P_i(\omega) \subseteq A, P_i(\omega) \subseteq B\}\} = \{\omega: P_i(\omega) \subseteq A \cap B\} = K_i(A \cap B)$
3. If $\omega \in K_iA$,so that $P_i(\omega) \subseteq A$,since $\omega_i \in P_i(\omega)$ ,it follows that $\omega \in A$ and so$K_iA \subseteq A$.
4. By the previous we have that $K_iK_iA \subseteq K_iA$. Now, let $\omega \in K_iA$ so that $P_i(\omega') = P_i(\omega)$,so it follows that $\omega' \in K_iA$ ,and since $\omega'$ is an arbitrary element of $P_i(\omega)$ it was shown that $P_i(\omega) \subseteq K_iA$ , and hence by definition $\omega \in K_iK_iA$
5. The left-hand side $(K_iA)^c$ represents the event that agent $i$ does *not* know $A$. The right side, $K_i((K_iA)^c)$ represents the event that agent $i$ knows that they do not know $A$.In modal logic we apply positive introspection i.e. if an agent knows something, they know that they know it.Formally, $K_iA \Rightarrow K_iK_iA$. We also assume the negative introspection axiom i.e., if an agent does not know something, they know that they do not know it: $(K_iA)^c = K_i((K_iA)^c)$■

## 4.Reasoning Depth ,Kantian equilibrium and Nash equilibrium

This literature on reasoning depth postulates that each player has a bound $k$ on reasoning, where $k \in \{0,1,\dots\}$.So, a player with $k = 0$ is a nonrational and nonstrategic type which is allowed to take any action, and his behavior is used by other players to anchor their beliefs, see Strzalecki, T. (2014).But for a general $\text{Level} - k$ reasoning we have, For any level $k \geq 0$, a Level-$k$player maximizes their strategy by assuming that the other player is reasoning at Level $k - 1$.And mathematically for player $P_1$ we have:

*equation 15*

$$S_1^k = \arg\max_{s_1 \in S_1} U_1\left(s_1, S_2^{k-1}\right)$$

Where $S_2^{k-1}$ is the strategy that $P_2$ would select based on level $K - 1$ reasoning. At $S_1^0$ previous equals to:$S_1^0 = \arg\max_{s_1 \in S_1} U_1\left(s_1, s_2^{default}\right)$ ,where $s_2^{default}$ is some default assumption about $P_2$ strategy[11].Since the contribution by Nagel (1995), it is well established that limited depth of reasoning accounts for important features of experimental data which are missed by models of full rationality, see also Cooper et al.(2024).Here, we are not going to delve thoroughly into the literature on Kantian equilibrium but following Osborne,M.J., Rubinstein,A.(2023), and Roemer (2010), Roemer (2019), we will provide following definition:

[11] For level 1 reasoning we have: $S_1^1 = \arg\max_{s_1 \in S_1} U_1(s_1, S_2^0)$ . A Level- 1 player, such as $P_1$, assumes that $P_2$ is a Level-0 reasoner.

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*Definition 8:* A vector of strategies $\boldsymbol{\mathcal{L}} = (\boldsymbol{\mathcal{L}^1}, \dots, \boldsymbol{\mathcal{L}^n})$ is a multiplicative Kantian equilibrium of the game $\boldsymbol{G} = \boldsymbol{S}(\boldsymbol{V^1}, \dots, \boldsymbol{V^n})$ for $\forall \boldsymbol{i} = \boldsymbol{1}, \dots, \boldsymbol{n}$

*equation 16*

$$\arg_{\alpha \in \mathbb{R}_+} \max V^i(\alpha \mathcal{L}) = 1$$

Formally there is a set of $n$ agents with payoff function $V_i: \mathbb{R}_+^n \to \mathbb{R}$,We define effort also as: $\mathcal{L}^{-1} = (\mathcal{L}^1, \dots \mathcal{L}^{1-1}, \mathcal{L}^{i+1}, \mathcal{L}^n)$, and payoff function $V_i$ is strictly monotone and decreasing in $\mathcal{L}^{-1}$ $\forall i$ .

*Definition* 9*:* In a strategic game $\langle N, (A^i)_{i \in N} (\succcurlyeq^i)_{i \in N} \rangle$ an action profile $a = (a^i) = A$ is a Nash equilibrium $\forall i \in N$ :$(a^i, a^{-i}) \succcurlyeq^i (x^i, a^{-i}), \forall x^i \in A^i$.Where $(x^i, a^{-i})$ denotes the action profile that differs from $a$ only in that in action of individual $i$ is $x^i$ rather than $a^i$.And, $N = (1, .., N)$ is a set of players, and $u^i: A \to \mathbb{R}$ is a payoff function for player $i$.And for preferences, $\forall i \in N \succcurlyeq^i$ over the set $A^i = \times_{i \in N} A^i$of action profiles.

*Definition* 10*:* Let $\Gamma = \langle N, , H, P(\succcurlyeq^i)_{i \in N} \rangle$ be an extensive game A strategy profile $s$ is a Nash equilibrium of $\Gamma$ if for every player $i \in N$ we have:$z(s) \succcurlyeq^i z(s^{-i}, r^i)$, for every strategy $r^i$ of player $i$. Where, for any strategy profile,$\sigma(z(\sigma)$ s the terminal history generated by $\sigma$.

*Definition* 11*:* Let $s$ be a strategy profile for the extensive game $\langle N, H, P, (\succcurlyeq^i) i \in N \rangle$. The
terminal history generated by $s$ is $(a_1, \dots, a_T)$ where $a_1 = s^{P\emptyset}(\emptyset)$ and $a_{t+1} = s^{P(a_1, \dots, a_t)}, t = 1, \dots, T-1$.

## 5. Bounded rationality: Luce model with bounded rationality included

Bounded rationality is understood as rationality exhibited by actual human economic behavior, see Selten (1998). Also see Simon (1957). Luce material draws from Luce (1959/2005).

*Definition 12* : $\rho$ has a Luce representation if there $\exists w: X \to \mathbb{R}_{++}$,where $\rho$ is a stochastic choice function,$X$ is a set of alternatives and:

*equation 17*

$$\rho(X, A) = \frac{w(X)}{\sum_{y \in A} w(Y)}$$

Where $A, B, C \subseteq X$ are finite choice problems or menus. A probability space here is:$(\Omega, \mathcal{F}, \mathbb{P})$ and $\mathcal{F}$ - measurable random utility function $\widetilde{U}: \Omega \to \mathbb{R}^X$.

*Axiom 1* Let $T \subseteq_{finite} U$ such that,$\forall S \subset T, P_S$ is defined:

- If $P(x, y) \neq 0,1$ $\forall x, y \in T$ , then for $R \subset S \subset T$
$$P_T(R) = P_S(R) P_T(S);$$
- If $P(x, y) = 0$ for some $x, y \in T$ , then $\forall S \subset T$
$$P_T(R) = P_{T-\{x\}}(S - \{x\});$$

*Axiom 2* The ordinary probability axioms are :

- For $S \subset T$ ,$0 \leq P_T(S) \leq 1$

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- $P_T(T) = 1$
- *If* $R, S \subset T$ and $R \cap S = \varphi$,then $P_T(R \cup S) = P_T(R) + P_T(S)$

Independence of irrelevant alternatives, see Luce, R. D. (1977) :

*Lemma 3* if $P(x, y) \neq 0{,}1\ \forall x, y \in T$, then Axiom1 implies that $\forall S \subset T$ such that $x, y, \in S$
*equation 18*

$$\frac{P(x,y)}{P(y,x)} = \frac{P_S(x)}{P_S(y)}$$

Proof: By the Axiom 1 we know that:$P_S(x) = P(x,y)[P_S(x) + P_S(y)]$
So now:
*equation 19*

$$P_S(x)[1 - P(x,y)] = P_S(x)P(y,x) = P(x,y)P_S(y)\blacksquare$$

One simple case of Luce model with bounded rationality will be shown in this section. With bounded rationality, the players are less sensitive to differences in utility, making the choice probabilities more balanced and less extreme than in a fully rational model. This dynamic can lead to slower convergence or even oscillations, depending on the balance between reinforcement and social influence. In this example parameters used are:$\lambda = 0.5$-this is bounded rationality parameter,$\alpha = 0.1$ - Learning rate for reinforcement,$\beta = 0.05$ - Social influence parameter,$T = 100$- Number of time steps.
*equation 20*

$$P(a_j) = \frac{e^{\lambda \cdot u(a_j)}}{\sum_{k=1}^{n} e^{\lambda \cdot u(a_k)}}$$

Where $u(a_j)$ denotes utility of player choosing option $a_j$ and the modified probability would be :$P_i(a_j) = \frac{u_i(a_j)}{\sum_{k=1}^{n} u_i(a_k)}$.Dynamic version of previous equation include $t$ superscript:$P_i^t(a_j) = \frac{u_i^t(a_j)}{\sum_{k=1}^{n} u_i^t(a_k)}$.Now for reinforcement Learning: In reinforcement learning, utilities are updated based on past choices and outcomes. So, if player $i$ chooses option $a_j$ at time $t-1$ ,then:
*equation 21*

$$u_i^t(a_j) = u_i^{t-1}(a_j) + \alpha \cdot \delta_i^{t-1}$$

Where $\alpha$ is learning rate and $\delta_i^{t-1}$ represents the reward (or penalty) player $i$ received from choosing $a_j$at time $t-1$. Players may also update their utilities based on the choices of others, with a social influence factor. If player $j$ has chosen option $a_k$ more frequently, other players may increase their perceived utility of $a_k$:

*equation 22*

$$u_i^t(a_k) = u_i^{t-1}(a_k) + \beta \sum_{j \neq 1} P_j^{t-1}(a_k)$$

Where $\beta$ is parameter governing the influence of others' choices on player $i's$ utility. Next ,it will be presented dynamic market with competing brands. Imagine a market with two competing brands, $\underline{A}$ and $B$, and two players representing consumers who make probabilistic choices between the brands. Each consumer updates their

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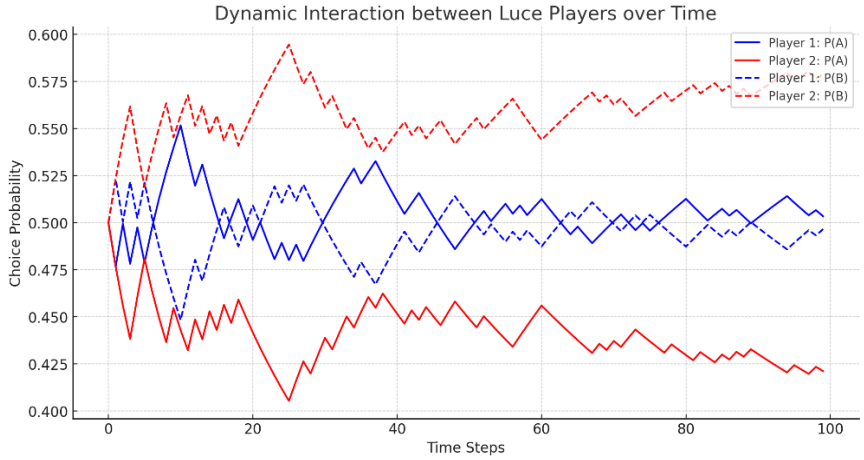
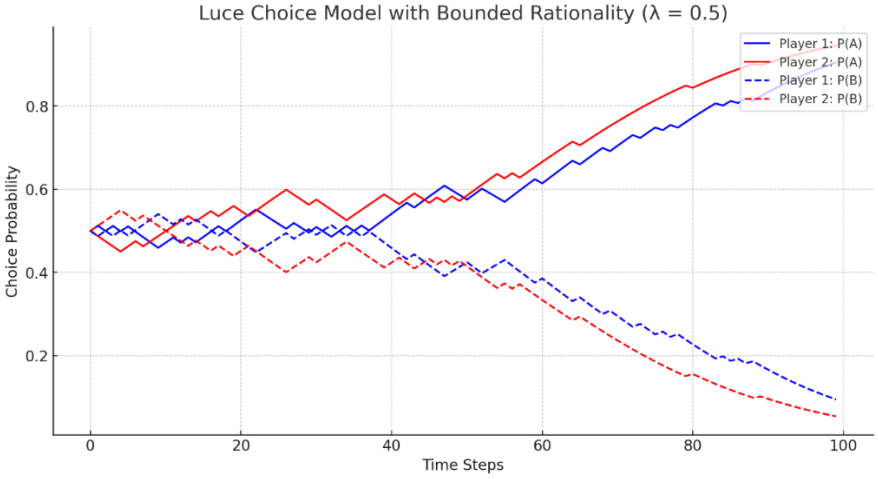
perceived utility based on personal satisfaction (reinforcement) and by observing the choices of the other consumer (social influence).

*Figure 1 Dynamic interaction between Luce players*




Source: Author's own calculation

*Figure 2 Luce's choice model with bounded rationality parameter $\lambda = 0.5$*




Source: Author's own calculation

### 5.1 Conditional probability theory and Luce model

The conditional probability of $S$ given $T$ such that $p(T) > 0$ is defined as:

*equation 23*

$$p(S|T) = \frac{p(S \cap T)}{p(T)}$$

Now if $R \subset S \subset T$ , following axiom 1(If $P(x, y) \neq 0,1\ \forall x, y \in T$ , then for $R \subset S \subset T$ ; $P_T(R) = P_S(R)P_T(S)$) ;then:

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*equation 24*

$$p(R|S)p(S|T) = \frac{p(R \cap S)}{p(S)}\frac{p(S \cap T)}{p(T)} = \frac{p(R)}{p(S)}\frac{p(S)}{p(T)} = \frac{p(R \cap T)}{p(T)} = p(R|T)$$

For this section see more in Rényi, A.(1955). This is, of course, the formal analogue of part i of axiom 1. By taking three arbitrary sets, instead of $R \subset S \subset T$, a somewhat more general condition can be shown to hold.

## 5.2 Matching law formulation

Here it is formulated following theorem, and it is provided a proof.

*Theorem 1* Any matching law selection rule satisfies Luce's choice axiom. Conversely, if $p(a|A) > 0\ \forall a \in A \subset X$ , then Luce's choice axiom implies that it is a matching law selection rule.

*Proof*: The **matching law** states that the probability of selecting an option $a$ from a set of alternatives $A$ is proportional to some positive utility or "value" $v(a)$ associated with $a$. Formally, a selection rule follows the matching law if:$p(a|A) = \frac{v(a)}{\sum_{b\in A} v(b)}$.Where $v(a) > 0, \forall a \in A$. Luce's choice axiom or Independence from Irrelevant Alternatives (IIA) states that for any two options $a, b \in A$:

*equation 25*

$$\frac{p(a|A)}{p(b|A)} = \frac{p(a|\{a,b\})}{p(b|\{a,b\})}$$

Under the matching law, we have: $p(a|A) = \frac{v(a)}{\sum_{c\in A} v(c)}; p(b|A) = \frac{v(b)}{\sum_{c\in A} v(c)}$ Hence: $\frac{p(a|A)}{p(b|A)} = \frac{\frac{v(a)}{\sum_{c\in A} v(c)}}{\frac{v(b)}{\sum_{c\in A} v(c)}}$ . Similarly for the set $\{a, b\}$ :

*equation 26*

$$\frac{p(a|\{a,b\})}{p(b|\{a,b\})} = \frac{\frac{v(a)}{v(a)+v(b)}}{\frac{v(b)}{v(a)+v(b)}} = \frac{v(a)}{v(b)} \blacksquare$$

Since both ratios are equal, the matching law selection rule satisfies Luce's choice axiom.

Next, we may code and plot this theorem. First, we will define utilities: we will assign positive arbitrary values $v(a), \forall a \in A$. Then we will calculate probabilities by the matching law:$p(a|A) = \frac{v(a)}{\sum_{b\in A} v(b)}$.And we will verify Luce's Choice Axiom: check for each pair of options $a, b$ that $\frac{p(a|A)}{p(b|A)} = \frac{v(a)}{v(b)}$. The plot shows the matching law probabilities for each option based on their assigned utilities. Here's the summary of the ratios for each pair of options to verify Luce's choice axiom:

- Ratio $a/b$: $\frac{p(a|A)}{p(b|A)} = 0.6; \frac{v(a)}{v(b)} = 0.6$
- Ratio $a/c$: $\frac{p(a|A)}{p(c|A)} \approx 1.5; \frac{v(a)}{v(c)} = 1.5$
- Ratio $b/c$: $\frac{p(b|A)}{p(c|A)} = 2.5; \frac{v(a)}{v(c)} = 2.5$

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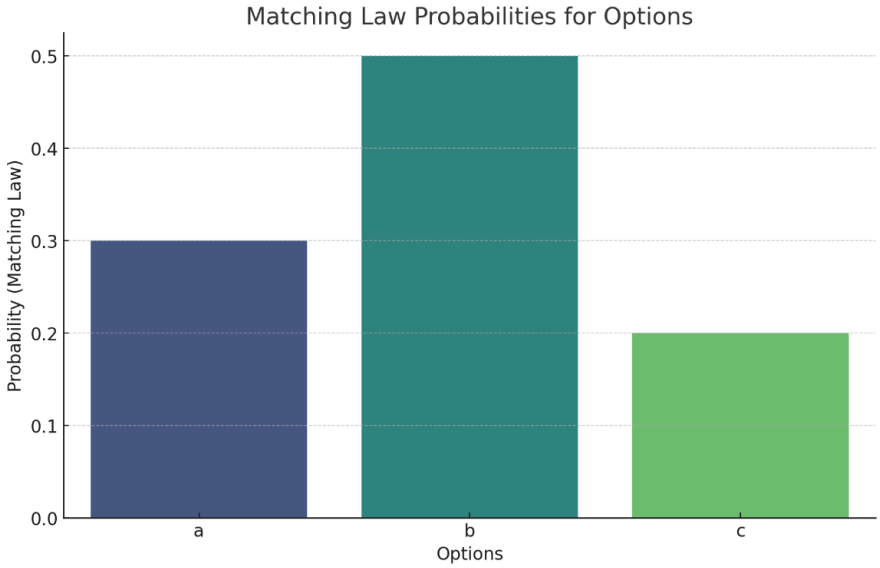
Since the probability ratios are equal to the utility ratios for each pair, the plot and calculations confirm that this selection rule satisfies Luce's choice axiom. The plot will be shown on the following page.

*Figure 3 Matchin law probabilities for options*




Source: Author's own calculation

## 6.The Agreement Theorem

Aumann (1976) posed the following question: could two individuals who share the same prior ever agree to disagree? See Levin (2016). That means if $i, j$ share common previous beliefs over states of the world, could it be that state arise at which it was commonly known that $i$ assigns probability of some evet $\mathcal{p}_i$,and $j$ assigned probability of $\mathcal{p}_j$ and$\mathcal{p}_i \neq \mathcal{p}_j$. Aumann concluded that this sort of disagreement is impossible. Now, formally let $p$ be a probability measure on $\Omega$ which are agents' prior belief. For any state $\omega$ and event $E$ , let $p\big(E\big|\mathcal{p}_i(\omega)\big)$ denote $i's$ posterior belief, so that $p\big(E\big|\mathcal{p}_i(\omega)\big)$ is obtained under Bayes' rule.The event that agent $i$ assigns probability $\mathcal{p}_i$ to $E$ is $\{\omega \in \Omega: p(E|\mathcal{p}_i(\omega) = \mathcal{p}_i)\}$

*Proposition 2* Suppose two agents have the same prior belief over a finite set of states $\Omega$. If each agent's infomation function is partitional and it is common knowledge in some state $\omega \in \Omega$ that agent 1 assigns probability$\mathcal{p}_1$ to some event $E$ and agent 2 assigns probability $\mathcal{p}_2$ to E, then $\mathcal{p}_1 = \mathcal{p}_2$

*Proof*: If the assumptions are satisfied then there is some self-evident event $F$ and $\omega \in F$ :

*equation 27*

$$F \subset \big\{(\omega' \in \Omega: p(E|\mathcal{p}_1(\omega') = \mathcal{p}_1) \cap \{(\omega' \in \Omega: p(E|\mathcal{p}_2(\omega') = \mathcal{p}_2)\}\big\}$$

Since $\Omega$ is finite, so is the number of sets in each union and let $F = \cup_k A_k = \cup_k B_k$ and for a nonempty disjoint sets $C, D$ with with $p(E|C) = \mathcal{p}_i$ and $p(E|D) = \mathcal{p}_i$ we have that

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$p(E|C \cup D) = \wp_i$,and $\forall k, p(E|A_k) = \wp_1$,then $p(E|F) = \wp_1$ and similarly $p(E|F) = p(E|B_k) = \wp_2$ ■

## 7.Numerical examples

**First example**: Let's assume the initial beliefs of the three agents are as follows for the two worlds:

*Table 1 agents initial beliefs*

| |
|---|
| Agent 1: [0.6, 0.4] |
| Agent 2: [0.5, 0.5] |
| Agent 3: [0.7, 0.3] |

In this python code defined parameters are

# Define parameters : $n_{agents}$ = 3 # Number of agents ,$n_{worlds}$ = 2 # Number of worlds, $n_{iterations}$ = 5 # Number of iterations for belief updates, $k_{levels}$ = [0, 1, 2] # Levels of cognitive reasoning.We'll run the belief updates over 5 iterations to see how beliefs evolve. To simulate k-level thinking, we can add some Gaussian noise to the beliefs during updates. For each iteration, we'll calculate the Nash and Kantian equilibria based on the agents' beliefs.

*Table 2*

| Iteration | Agent 1 | Agent 2 | Agent 3 | Nash EQ | Kantian EQ |
|---|---|---|---|---|---|
| 1 | [0.78145853 0.21999514] | [0.69146899 0.10070053] | [0.82334435 0.16441218] | [0.82334435 0.21999514] | [0.76542396 0.16170262] |
| 2 | [0. 0.60697405] | [0.12356335 0.5870302 ] | [0.05509522 0.67869425] | [0.12356335 0.67869425] | [0.05955286 0.62423284] |
| 3 | [0.48865891 0.30727302] | [0.36306045 0.36296319] | [0.60827405 0.2132603 ] | [0.60827405 0.36296319] | [0.48666447 0.29449884] |
| 4 | [0.10082487 0.16559914] | [0.27067617 0.2018131 ] | [0.20415334 0.17422747] | [0.27067617 0.2018131 ] | [0.19188479 0.18054657] |
| 5 | [0.49093557 0.11045239] | [0.67386333 0.19782752] | [0.55193592 0.36106872] | [0.67386333 0.36106872] | [0.57224494 0.22311621] |

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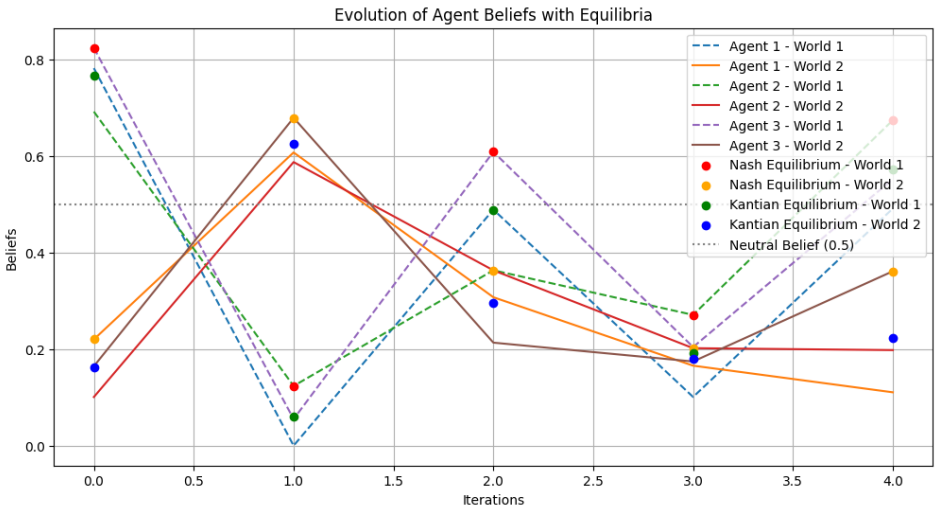
*Figure 4 Evolution of agents beliefs with Kantian and Nash equilibria*

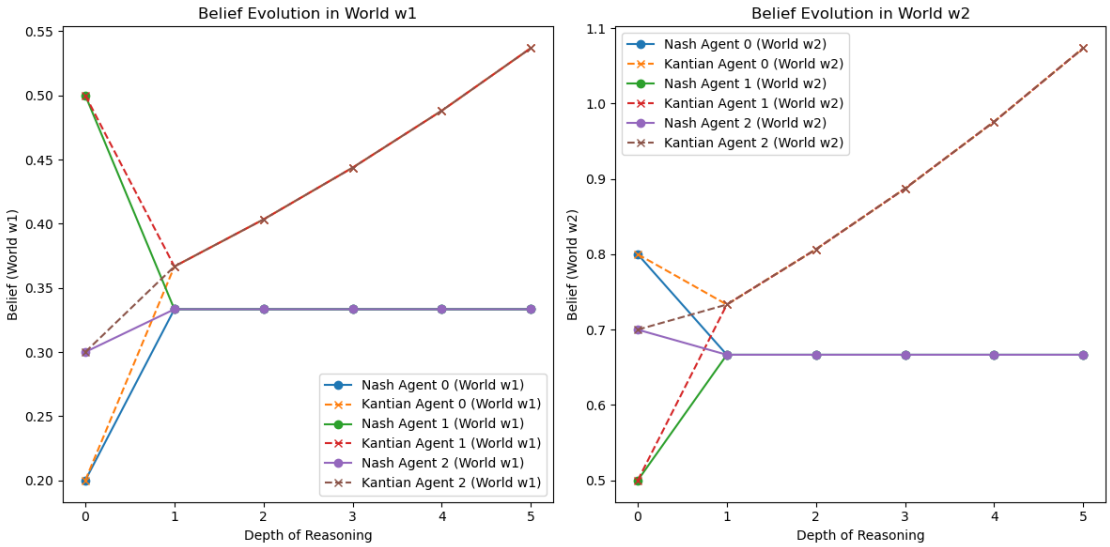



Source: Author's own calculation

This numerical example provides insight into how agents' beliefs evolve in a structured way and how those beliefs can converge to equilibria based on the reasoning level of the agents. This model captures the interactions between bounded rationality, beliefs, and the moral reasoning framework of Kantian equilibrium. Each agent's decisions are based on their cognitive depth while considering the moral implications of their actions and beliefs. This framework can be further elaborated into computational models or simulations to analyze the dynamics of belief convergence, the impact of different levels of reasoning, and the emergence of common knowledge under various settings.

**Second example**: To address this complex theoretical framework, let's integrate several core concepts into a single model by combining Kripke semantics, bounded rationality, common knowledge (especially relevant in Kripke semantics), Aumann's Agreement Theorem, Kantian and Nash equilibria, and k-level thinking in a cognitive hierarchy. I'll outline each element of the framework, then derive a model that applies this to an economic network that operates within a semantic economy. The goal is to showcase how agents interact in such a network to create informational value.

*Figure 5*



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Source: Author's own calculation

Some equations of the model used for the previous plots are: Consider a Kripke model with a set of agents $A = \{1,2,\dots,N\}$ } and two accessible worlds $W = \{w1, w2\}$ representing different economic states.

**Agent Beliefs and Bounded Rationality**:

- Each agent $i \in A$ holds beliefs over $W$, denoted as $b_i(w)$ for world $w$.
- Agents update their beliefs iteratively with a bounded rationality constraint, applying k-level thinking up to their cognitive hierarchy level $k_i$

**Belief Update Mechanisms**:

- **Nash Belief Update**: Agent $i's$ Nash belief update at level $k_i$ depends on the mean beliefs of other agents in the network.

*equation 28*

$$b_i^{Nash}(w) = \frac{1}{N-1}\sum_{j \neq i} b_j(w)$$

- **Kantian Belief Update**: Each agent $i$ updates beliefs by reflecting on the common benefit and adjusting towards a shared belief.

*equation 29*

$$b_i^{Kantian}(w) = b_i(w) + \alpha\left(\frac{1}{N}\sum_j b_j(w)\right)$$

Here, $\alpha$ represents the level of introspection, capturing the Kantian principle of considering the joint outcome.

**Aumann's Agreement and Almost Common Knowledge**:

- After several rounds of belief updates, beliefs converge as per Aumann's Agreement Theorem when almost common knowledge is established—i.e., agents share a sufficiently high belief in each other's beliefs across worlds.

**Fixed-Point Condition in Cognitive Hierarchy**:

- For agents to reach a **fixed-point** agreement, each agent's belief update (at any reasoning depth $k_i$) should stabilize across worlds:

*equation 30*

$$b_i^*(w) = b_i(w), \forall i \in A\,; w \in W$$

**Semantic Economy and Informational Value Creation**:

- In an economic network, agents share and evolve their beliefs to create informational value, not merely to reduce costs. This added value emerges as agents reach consensus and stabilize around shared insights, enhancing collective knowledge within the network.

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**Third example**: To derive a mathematical model that unites **Kripke semantics**, **bounded rationality**, **common knowledge (CK)**, **Aumann's Agreement Theorem**, **Kantian Nash equilibrium**, **k-level reasoning**, and **Cognitive Hierarchy Theory** within the framework of an **economic network**, we must consider a few foundational elements. This model will illustrate how cognitive reasoning and network interactions influence economic advantage, not through information cost reduction, but by generating new informational value across a network.

**Components of the Model**

1. **Kripke Semantics**: A framework for modeling knowledge and beliefs across possible worlds.
2. **Bounded Rationality**: Agents have limitations in processing power and information.
3. **Common Knowledge (CK)**: Formally, an event ppp is common knowledge if everyone knows $p$, everyone knows that everyone knows $p$, ad infinitum. We will use fixed-point logic to represent this.
4. **Aumann's Agreement Theorem**: Two rational agents with common priors and knowledge of each other's beliefs cannot agree to disagree. They will reach a consensus if they continue to exchange information.
5. **Kantian Nash Equilibrium (KNE)**: Each agent chooses a strategy that they would want all agents to adopt collectively.
6. **K-level Thinking in Cognitive Hierarchy Theory**: Each agent is modeled as having a finite depth of reasoning. Agent 0 acts without considering others, agent 1 considers agent 0's reasoning, and so forth.
7. **Networked Economic Context**: Agents interact in an economic network where competitive advantage depends on the informational value generated across the network.

**Model Assumptions and Definitions**

- **Agents** $A = \{1,2,\dots,N\}$ in a networked economy.
- **Possible Worlds**: Each agent has beliefs over a set of possible worlds $W$.
- **Information Sets**: Each agent iii has a finite set of beliefs $B_i$ about events and possible worlds, representing bounded rationality.
- **Common Knowledge (CK)**: Defined through a fixed-point condition across agent beliefs in a given world $w$.
- **Kantian Nash Equilibrium (KNE)**: Agents choose strategies for a common good, reflecting rational expectations across the network.
- **K-level Reasoning**: Each agent reasons up to level $k_i$ varying by agent. This represents the cognitive hierarchy in the network.

**Step 1: Define Knowledge in Terms of Kripke Semantics**

- Let $W$ be the set of possible worlds, with $w \in W$ representing a particular state of the world.

  Each agent $i$ has:

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- **Access Relation** $R_i$: An agent's relation on $W$ that reflects their perspective (or information) about the different possible worlds.
- **Knowledge representation**: $K_i(p)$:Where $K_i(p) = \{w \in W | p \; is \; true \; in \; all \; accesible \; worlds \; by \; R_i\}$
- **For common knowledge (CK)** of event $\boldsymbol{p}$, it holds that: $CK(P) \Leftrightarrow K_1(p) \wedge K_2(p) \ldots\ldots \wedge K_N(p) \wedge K_1\big(KK(p)\big) \wedge K_2\big(KK(p)\big)..$

  This means that for $\boldsymbol{p}$ to be common knowledge, each agent must know $\boldsymbol{p}$ and know that others know$\boldsymbol{p}$,iteratively, which creates a fixed-point in logic.

**Step 2: Represent Bounded Rationality and K-Level Thinking**

Each agent iii can reason up to a finite **depth** $k\_i$, which represents bounded rationality within **Cognitive Hierarchy Theory**:

- **Agent 0** has no reasoning about others.
- **Agent $\boldsymbol{k}$** believes that others reason up to depth $k - 1$

Let $B_i^k$ represent the beliefs of agent $i$ at reasoning depth $k$. If $k \to \infty$ agents would theoretically reach full common knowledge; however, bounded rationality limits $k_i$.

**Step 3: Incorporate Aumann's Agreement Theorem and Kantian Nash Equilibrium**

1. **Aumann's Agreement Theorem** implies that if agents iii and jjj have common priors and share beliefs up to common knowledge, they cannot "agree to disagree."
2. For Kantian Nash Equilibrium (KNE), agents maximize **social utility** by adopting strategies they would prefer all agents to adopt, which is consistent with cooperative decision-making.

Define each agent's **utility** function in the economic network as:
*equation 31*

$$U_i(s) = f(s) + g\big(s, B_i^k\big) + h\big(B_j^{k-1}\big)$$

$f(s)$-represents strategy dependent payoff, $g\big(s, B_i^k\big)$ -personal information dependent component, $h\big(B_j^{k-1}\big)$:Network (others' beliefs)-dependent component, capturing information value.

**Step 4: Competitive Advantage through Informational Value**

In a **semantic economy**, agents' competitive advantage depends on the informational value they create for the network:
*equation 32*

$$V_i = \sum_{j \in A} h\big(B_j^{k-1}\big) - cost(B_i)$$

Where here:

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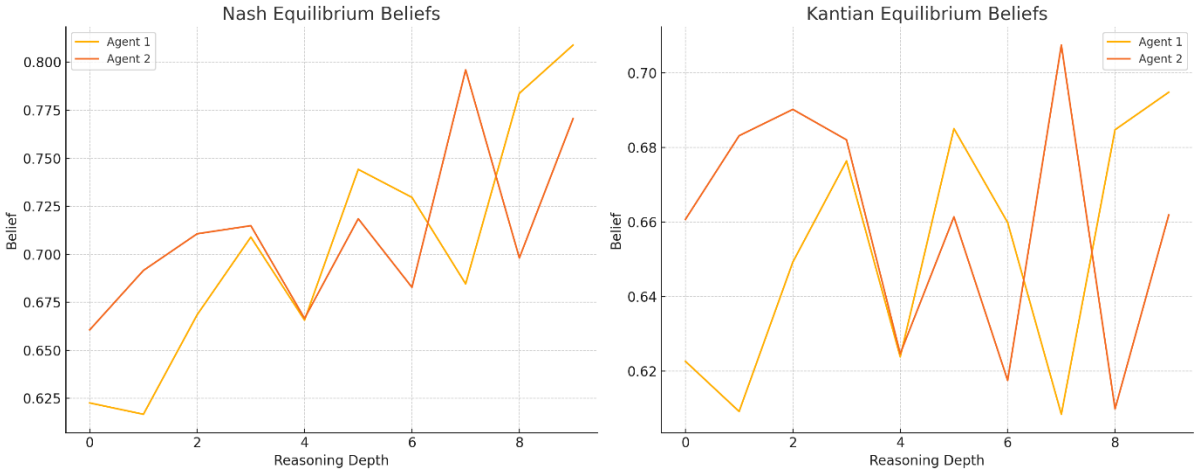
- **informational Value** $V_i$: Derived from the sum of other agents' knowledge contributions.
- **Cost**: The cost of acquiring or processing information.

Thus, an agent maximizes utility by maximizing $V_i$ rather than minimizing information acquisition costs. This value-driven approach leads agents to choose strategies that enhance collective knowledge.

Parameters in following simulation are:
$n_{agents}$ = 2 # Number of agents $n_{depths}$ = 10 # Levels of reasoning depth $true_{probability}$ = 0.65 # Initial true probability in the world. In this model and simulation model is improved to ensure:

1. Depth of reasoning variation in the belief values for each equilibrium, showing progressive adjustments as reasoning depth increases.
2. Distinct Nash and Kantian adjustments reflect the Kantian emphasis on aligned beliefs and mutual benefit, while the Nash framework remains based on best responses to others' beliefs at each depth level.

*Figure 6*




Source: Author's own calculation

The plots show the belief evolution across reasoning depths, highlighting the differences between Nash and Kantian equilibria.

*Table 3* Nash Equilibrium Beliefs

| Agent | Depth 0 | Depth 1 | Depth 2 | Depth 3 | Depth 4 | Depth 5 | Depth 6 | Depth 7 | Depth 8 | Depth 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Agent 1 | 0.6226 | 0.6167 | 0.6685 | 0.7090 | 0.6657 | 0.7442 | 0.7296 | 0.6846 | 0.7838 | 0.8089 |
| Agent 2 | 0.6607 | 0.6916 | 0.7107 | 0.7149 | 0.6666 | 0.7185 | 0.6828 | 0.7960 | 0.6981 | 0.7706 |

Source: Author's own calculation

*Table 4* Kantian Equilibrium Beliefs

| Agent | Depth 0 | Depth 1 | Depth 2 | Depth 3 | Depth 4 | Depth 5 | Depth 6 | Depth 7 | Depth 8 | Depth 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Agent 1 | 0.6226 | 0.6092 | 0.6492 | 0.6763 | 0.6238 | 0.6850 | 0.6598 | 0.6084 | 0.6847 | 0.6948 |
| Agent 2 | 0.6607 | 0.6831 | 0.6902 | 0.6820 | 0.6246 | 0.6614 | 0.6175 | 0.7074 | 0.6098 | 0.6619 |

Source: Author's own calculation

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Nash versus Kantian Equilibrium: The Nash equilibrium beliefs show a slightly greater upward trend as the depth of reasoning increases. This is because Nash beliefs adjust based on others' best responses, while Kantian beliefs account for mutual benefit, dampening large shifts.

## 8.Conclusion

Simulation of Kripke semantics, bounded rationality, common knowledge, Aumann's agreement theorem, Kantian Nash equilibrium, and k-level thinking within the framework of Cognitive Hierarchy Theory (CHT), captures the interactions between bounded rationality, beliefs, and the moral reasoning framework of Kantian equilibrium. Each agent's decisions are based on their cognitive depth while considering the moral implications of their actions and beliefs. When we estimate deviations of beliefs, we have in mind that: Nash equilibrium are the beliefs that maximize each agent's utility given the others' beliefs. Kantian Equilibrium represents the average beliefs of all agents at a specific iteration, reflecting a consensus view. Results from the first example show that agents change their beliefs from the initial values. Simulations are done for 3 agents in 2 worlds, and evolution of beliefs is shown in 5 iterations. K-level thinking with Gaussian noise was employed here too. Results show that agents 1,2,3 beliefs differ from Kantian and Nash equilibria. At 50% of iterations Kantian equilibrium is identical to neutral belief. Nash equilibrium follows Kantian equilibrium in the two worlds but exerts larger shifts from initial beliefs. At ¾ of iterations agents 1,2,3 beliefs converge with Kantian and Nash equilibria, and they diverge once again. This is in line with the idea that small departures from common knowledge can have a dramatic effect on the set of equilibria. So, even if each layer is certain about the payoffs structure, even small incremental uncertainty about other's information can eliminate equilibria that exists when payoffs are common knowledge. This naturally leads to further explorations on this topic and some striking examples in the literature such as Rubinstein (1989). The fact that small perturbations of the information structure can eliminate Nash equilibria occurs because the Nash equilibrium correspondence (mapping from the parameters of the game to the set of equilibrium strategies) is not lower semi-continuous, see Levin (2016). The second example shows belief Evolution in world w1 and w2: The plots show each agent's belief trajectory over different reasoning depths. Nash equilibrium beliefs tend to cluster closely, while Kantian beliefs evolve with greater alignment, showing the cooperative tilt in introspective (Kantian) reasoning. Nash beliefs: Each agent averages the beliefs of all other agents. Over several reasoning layers, these beliefs evolve toward a shared understanding, though agents are individually optimizing. When the reasoning depth increases, players recognize more intricate patterns in others' intentions and responses. This depth often leads to more robust cooperative expectations, as players anticipate others' willingness to adopt strategies that align more closely with a collective or "Kantian" principle. As a result, the Kantian beliefs about what is rational or optimal under cooperative strategies become stronger or "shift up."Nash equilibria differ from initial true probability in the world

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of tourism should follow a sustainable approach and respect the natural and cultural heritage. Environmental protection and preservation of cultural identity are the main challenges that must be addressed in the development of the tourism sector. In the future perspective, to increase the value of tourism in the municipality of Peja, it is important to design a sustainable and coordinated strategy. In order to achieve this, cooperation with the private sector, inclusion of the local community in decision-making processes and international cooperation are key. If all these aspects are carefully addressed, tourism can continue to be a driver of economic development in the municipality of Peja, bringing lasting benefits to the local community and improving the overall economic and cultural life in this area.

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# CHALLENGES IN MANAGING EMPLOYEES WITH DIFFERENT CHARACTERISTICS

Mimoza Serafimova[1],Drasko Atanasoski,[2] Ruzica Nikolova[3,]

[1]PhD, Faculty of Tourism and Business Logistics, Goce Delcev University, Stip, North Macedonia, mimoza.serafimova@ugd.edu.mk
[2]PhD, Faculty of Tourism and Business Logistics, Goce Delcev University, Stip, North Macedonia, drasko.atanasoski@ugd.edu.mk
[3]Student od Second cycle studies, Faculty of Tourism and Business Logistics, Goce Delcev University, Stip, North Macedonia, ruzica.217182@student.ugd.edu.mk

**Abstract**

Inclusive management of diversity in the work environment is essential to organizational success and productivity in today's globalized world. With employees who differ in terms of culture, generation, gender and socio-economic background, organizations face unique challenges as well as opportunities. The inclusion of all team members, regardless of their characteristics, not only improves team dynamics, but also increases innovation and employee engagement. Research shows that inclusive cultures have a significantly higher rate of employee satisfaction, which in turn leads to increased loyalty and a better reputation for the organization.

The role of inclusive leadership is crucial in creating a work environment where diversity is valued. Leaders with cultural intelligence and empathy contribute to the development of trust and cooperation in teams, which supports organizational growth and productivity. By using cultural competence training and introducing inclusive policies, companies create conditions in which employees can express their potential and feel valued.

In conclusion, inclusive management not only helps to overcome differences, but also lays the foundation for long-term success and positive organizational development.
Keywords: inclusive management, management challenges, cultural intelligence

## 1. Introduction

One of the main challenges in managing diversity is ensuring effective communication. Different cultures and generations have different ways of communicating and expectations, which can lead to misunderstandings and conflicts within teams. For example, collectivist cultures may place more importance on teamwork, while individualistic cultures focus more on personal achievement. ( Livermore 2010 ). Gender differences and socio-economic characteristics can also reduce equity and inclusiveness if not carefully managed.

In addition to communication challenges, diversity can also lead to differences in work style and perception of performance. These differences require managers to develop inclusive policies and strategies that will meet the needs of all employees and ensure a positive and productive work environment. Adler's research indicates that companies that develop inclusive and flexible work environments have a higher rate of satisfaction and productivity ( Adler 2008) .

The aim of this paper is to explore how managers can successfully manage teams made up of people with different characteristics and backgrounds. Namely, different types of diversity and their impact on the dynamics of teamwork, as well as the key challenges arising from cultural, generational, gender and socioeconomic diversity will be considered.

Using a multidisciplinary approach and contemporary literature, strategies for effective diversity management will be analyzed and the role of inclusive leadership in creating a positive organizational culture will be explored.

During the research, a review will be given of best practices and examples of successful managers who have established inclusive and effective strategies for managing diverse teams. The ultimate goal is to show that, although diversity management can be a

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challenge, it simultaneously brings great opportunities for the development and success of companies.

## 2. Types of differences in the work environment

*Cultural diversity* is an essential part of the global labor market and is often present in multinational organizations. Different cultures bring different values, perceptions and ways of communication, which significantly affects work dynamics and teamwork. According to Hofstede's research, cultural diversity affects the perception of authority, teamwork and work balance, which can cause challenges for managers managing multicultural teams. ( Hofstede 2001)

For example, in collectivist cultures such as Japan and China, work ethic and loyalty to the organization are highly valued. In these cultures, teamwork and cooperation are emphasized, while in individualistic cultures such as the United States and Germany, personal success and independence are of primary importance. These cultural differences can lead to misunderstandings, especially when team members have different expectations about teamwork and attitudes toward authority.

To deal with these differences, managers can use the concept of "cultural intelligence" – the ability to understand and respect different cultural values and ways of communicating. According to Livermore, cultural intelligence is vital for leaders managing multicultural teams because it enables adaptation to the diverse needs of employees and fosters trust. (Livermore 2010)

*Generational differences* also have a significant impact on the work environment. Teams are often made up of different generations such as Baby Boomers, Generation X, Millennials and Generation Z, each with their own unique values and expectations. Generational differences are particularly pronounced in terms of the use of technology, loyalty to the organization and balancing work and private life.

For example, millennials and Generation Z have a strong preference for using digital tools and expect flexibility in work schedules. In contrast, Baby Boomers and Gen Xers are often attached to traditional work patterns and have different views on professional stability. (Twenge 2009)

According to Eversole and his colleagues, managers who understand generational differences have a greater ability to motivate and retain talented staff, creating effective strategies for including different generations in teams. (Eversole 2012)

*Gender differences* are often the cause of different approaches to management, especially in traditionally male-dominated industries. Research shows that although women participate significantly in many sectors, they often face barriers that limit their advancement. These barriers, also known as the "glass ceiling", often lead to discrimination and reduce the chances of professional development for women. (Eagly 2007)

Companies that actively promote gender equality have greater success in attracting and retaining talent. It is important for managers to develop gender equality policies that will ensure equal opportunities for all employees, regardless of gender. Policies such as flexible working hours and support for parents contribute to a more inclusive and positive work atmosphere. (Adler 2008)

*Socioeconomic and educational differences* can also play an important role in the work environment. Employees with different levels of education and socioeconomic backgrounds have different approaches to work and different expectations from management. For example, employees with higher education often want to actively participate in decision-making, while employees with less education may feel that they do not have enough support for their ideas. (Page 2007)

According to Adler's research, managers who understand the significance of socioeconomic differences and are aware of their impact can create an inclusive work environment that supports all employees, regardless of their background. (Adler 2008)

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## 2. Basic challenges in diversity management

One of the biggest challenges in managing multicultural teams is ensuring effective communication. Cultural differences can lead to different communication styles and perceptions of some important elements such as feedback and directness. For example, in cultures such as those in Asia, direct criticism is considered inappropriate, while in Western countries, directness is seen as beneficial for improving performance (Hofstede 2001) . As a result, employees from different cultural backgrounds may perceive criticism and feedback in different ways, leading to possible misunderstandings and conflicts.

In these situations, managers need to develop "communication flexibility," which involves adapting communication styles to suit the different cultural backgrounds of employees. According to Livermore, successful managers adopt and combine different communication strategies to reduce the possibility of cultural conflicts. (Livermore 2010)

Managers should create a culture of trust and open communication, where each employee will have the opportunity to express their ideas and feelings without fear of rejection.

One of the most significant obstacles in managing diverse employees is adapting to different work styles. Each employee has their own individual approach to tasks and different levels of engagement, and these differences are often more pronounced between different generations. For example, Millennials and Generation Z are more focused on flexible work schedules and the ability to work from home, while older generations such as Baby Boomers and Generations X are more attached to the traditional eight-hour workday. (Twenge 2009)

According to research by Eversole et al., conflicts often arise when employees have different perceptions of what is the "right" way to work. These differences can cause tensions and reduce productivity if managers do not take a proactive approach to resolving these misunderstandings. (Eversole 2012) and should create adaptable working conditions that will respond to different generational expectations and encourage individual engagement.

The generation gap is another significant challenge, especially in companies with a mix of different generations. Each generational segment has its own priorities and expectations for work balance, time management and communication style. For example, millennials value more flexibility and quick access to digital tools, while older generations show a greater attachment to stable and traditional structures. These differences can lead to misunderstandings and conflicts, especially in multigenerational teams. (Twenge 2009)

For managers, understanding and dealing with generational differences is key to creating a friendly and productive work atmosphere. Managers should adopt hybrid management strategies and create a space where every team member feels valued. According to research by Westerman et al., organizations that focus on combining different generational strengths have greater success in handling innovation and adapting to a fast-growing market. (Westerman 2014)

The challenges of managing diversity are many and complex, but by applying the right strategies and inclusive policies, managers can create an environment that encourages diversity and fosters employee development.

Understanding cultural, generational and gender differences is key to avoiding conflict and promoting effective communication and collaboration within teams. The ability of managers to embrace and value these diversities will not only help overcome challenges, but also support the organization's goals of achieving innovation and productivity.

## 3. The importance of inclusive leadership

In multicultural and diverse teams, the role of inclusive leadership is vital to successfully dealing with the diverse needs, attitudes and values of employees. Inclusive leadership means creating a culture where every employee, regardless of their background, feels valued and included. Research shows that leaders who promote inclusiveness contribute to better team dynamics, increased employee satisfaction and reduced conflict. (Page 2008) Leaders who understand diversity and strive for inclusiveness create an environment that

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allows for the free exchange of ideas, which in turn leads to increased productivity and innovation.

*Empathy* is the basis for inclusive leadership and plays a key role in creating mutual trust between leaders and employees. Leaders who demonstrate empathy can better understand the needs and attitudes of their teams, allowing them to make decisions that focus on employee well-being. According to research by Eagly and Carli, "leaders who adopt inclusive leadership reduce communication barriers and create a sense of belonging and security in teams" (Eagly 2007).

This helps develop strong and cohesive teams, which is especially important in multicultural work environments.

*Cultural intelligence (CQ)* is a key skill that helps in managing diversity and accepting different cultural values. Leaders with a high level of CQ can recognize and adapt to different cultural and personal communication and work styles. According to Livermore, cultural intelligence not only facilitates the management of multicultural teams, but also helps leaders build trust and respect for different values and work styles. (Livermore 2010)

*Trust and understanding* are fundamental components of any successful team, and inclusive leaders play a key role in creating these values. By encouraging open communication and supporting diversity, leaders can reduce stress and encourage employees to express themselves without fear. According to Kotter's research, "employees who trust their leaders and feel valued as individuals show greater engagement and productivity" (Kotter 2012).

In practice, inclusive leaders should regularly involve employees in decision-making processes, as well as encourage team activities that will support a sense of togetherness. This approach allows leaders to create a work environment where all employees feel safe and valued.

Many well-known companies and leaders have developed successful strategies to promote diversity, inclusion and cultural intelligence. For example, the company *Google* is known for its inclusive practices and programs to support diversity. Through its programs to support gender equality and cultural diversity, *Google* manages to attract and retain talent from diverse backgrounds, while fostering an innovative and dynamic workplace culture. By developing inclusive policies, companies like *Google* create opportunities for all employees to express their potential and actively contribute to organizational success. (Page 2007)

Another example of a successful inclusive leader is Satya Nadella, the CEO of *Microsoft* . Under his leadership, *Microsoft* adopted a "growth mindset," which encourages flexibility, collaboration, and continuous learning throughout the company. Nadella focuses on inclusion, which has led to increased employee engagement and satisfaction, as and to creating an environment where innovation is encouraged through collaboration between different teams. (Westerman 2014) This approach has shown how inclusive leadership can lead to higher results and greater company success globally.

*A focus on continuous learning and a growth mindset* is another important aspect of inclusive leadership. According to Dweck, leaders who adopt a growth mindset are more open to new ideas and challenges, which allows for greater flexibility and adaptation to the needs of diverse teams and .(Dweck 2006) Combined with inclusive policies and cultural intelligence, these strategies create a strong foundation for inclusive leadership that contributes to workplace productivity and satisfaction.

## 4. Strategies for effective diversity management

One of the most important strategies for managing diversity is cultural competency training, which enables employees and leaders to develop an understanding of and respect for different cultures and work styles. This training not only increases knowledge of cultural differences, but also develops skills for effective communication and handling conflicts that may arise from different attitudes. According to Livermore research, "cultural competence is the basis for successfully managing multicultural teams and increases the likelihood of creating a cohesive and productive work environment". (Livermore 2010)

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Through cultural competence training, employees learn how to recognize and respect cultural differences, which significantly reduces misunderstandings and increases team cohesion . In practice, these trainings can include interactive exercises, simulations and case studies that help employees understand the challenges and benefits of multicultural collaboration. Research shows that companies that invest in diversity training are more likely to develop an inclusive work culture and increase employee satisfaction. (Page 2007)

Inclusive equality policies are the foundation of successful diversity management. The introduction of such policies allows companies to ensure equality and inclusiveness, regardless of the cultural, gender or socioeconomic background of employees. These policies include recruitment guidelines, support systems for all employee groups, and equal access to opportunities for advancement and skill development.

Inclusion policies also include measures to support parents and provide flexible working conditions, which are particularly important for employees with family responsibilities. According to research by Eagly and Carli, companies that develop inclusive policies and equality show higher levels of employee satisfaction and talent retention. (Eagly 2007) Aquatic companies are better prepared to deal with challenges and have a greater chance of success in the global market.

Team dynamics and open communication are important aspects of an inclusive work environment, as they support the exchange of ideas and allow the free expression of opinions of all employees. Companies that actively support teamwork and internal communication are less likely to have conflicts and better deal with the challenges of diversity. According to research by Westerman and colleagues, "companies that promote a culture of open communication show higher levels of productivity and engagement among employees" (Westerman 2014).

One of the effective strategies for improving team dynamics is the introduction of regular team meetings and the team building activities. Such activities allow employees from different backgrounds to connect and develop trust, which is especially important for creating an inclusive work atmosphere. In the modern multicultural context, companies often also use digital communication tools that enable the exchange of ideas and opinions in real time, regardless of geographical distance.

Companies that introduce flexible policies, such as working from home and flexible working hours, are more likely to retain talent and improve their satisfaction. For example, large companies like *IBM* and *Salesforce* have already introduced work-from-home policies that allow employees to choose the best way to work according to their needs. (Adler 2008)

In addition to flexible working conditions, companies should support employees with continuous learning and professional development programs. These programs help employees master the new skills and technologies necessary for their success in a dynamic work environment. Continuous learning is especially important in times of rapid technological change, as it helps employees from different generations and cultural backgrounds stay competitive and ready for new challenges.

According to Dweck, organizations that support a "growth mindset" create a positive learning culture where employees are encouraged to learn and develop. (Dweck 2006) Professional development programs can include leadership training, technical training, workshops for communication skills and diversity and inclusion courses. Such programs not only increase the level of competence of employees, but also contribute to increased self-confidence and engagement.

Effective diversity management requires the application of a multidimensional approach that supports inclusiveness and equity in every aspect of the organization. Through cultural competency training, developing inclusive policies, promoting open communication and flexible working conditions, companies can create a productive and positive work atmosphere. Examples from companies such as *Google* and *Microsoft* show that inclusive management and support of diversity lead to higher levels of employee engagement and satisfaction, which is key to organizational success in the global marketplace.

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## 5. Measuring success in inclusive management

Measuring success in inclusive management is key to understanding the impact that diversity strategies have on employees and the organization. One of the primary indicators is employee satisfaction, which can be measured through satisfaction surveys and employee feedback. According to research, employee satisfaction is closely related to their sense of belonging and inclusion. (Westerman 2014) Organizations that invest in inclusive leadership and diversity management tend to show higher levels of employee satisfaction.

Employee engagement is another important indicator, as it represents their desire to be part of the organization and their interest in career advancement. According to Gallup research, high engagement is associated with productivity and innovation, which is especially significant in multicultural and multigenerational teams. (Gallup 2017) Engagement is measured by assessing employees' interest in additional activities, their initiative and propensity for long-term loyalty to the company.

Productivity is a measurable indicator that indicates the effectiveness of teams and their ability to collaborate in diverse and inclusive settings. One of the ways to measure productivity is through the analysis of individual and team performance and achieved goals. According to Livermore's research, "teams that are managed by inclusive leaders show higher results because diversity leads to creative solutions and innovations" (Livermore 2010). Diversity allows for a wider range of ideas, which in turn affects teams' ability to make innovative decisions.

## 6. Case studies: Successful examples of inclusive management

Many companies are showing positive results through their inclusive practices. For example, *Salesforce* is known for its inclusive policies, which focus on providing equal opportunities for all employees and supporting diversity. *Salesforce* introduced programs for leadership development, flexible working hours and support for parents, which led to increased engagement and satisfaction of employees. (Eversole 2012) These policies contributed to improving creativity and productivity of teams, and the company became recognized for its positive brand of the labor market.

A similar example is the *IBM company* , which develops inclusive strategies and actively promotes diversity through various programs and initiatives. *IBM* encourages employees to participate in diversity training and leadership development, and additionally offers work-from-home opportunities and flexible work schedules. (Adler 2008) As a result, the company manages to retain talent and attract new employees from different cultural and socioeconomic backgrounds, leading to increased innovation and competitiveness.

To ensure that inclusive measures have a positive impact on business results, organizations should regularly monitor progress through clearly defined goals and indicators of success. These indicators include employee retention rates, increased productivity and engagement, as well as financial results. According to Gallup research, "companies that invest in inclusiveness have higher customer loyalty and employee satisfaction, which is a key factor in financial growth" (Gallup 2017).

Performance measurement in inclusive management is a complex process that requires an integrated approach to monitor employee satisfaction, engagement, productivity and financial results. Companies like *Salesforce* and *IBM* show that inclusive management not only contributes to a better work culture, but also to long-term success. Indicators such as employee retention, team cohesion and market success are key to assessing the impact of inclusiveness on organizational success.

## Conclusion

This paper elaborated on the challenges and benefits of managing diversity in the work environment. With the integration of cultural, generational, gender and socio-economic differences, modern workplaces are becoming more diverse, but also more complex to manage.

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The analysis showed that diversity significantly affects the dynamics of teamwork and organizational culture, which creates a need for inclusive leadership and a strategic approach to management. Inclusive practices, such as cultural competency training and the development of inclusive policies, have been shown to be key to creating a positive work environment that supports employee productivity and satisfaction. (Page 2007)

According to Gallup research, "companies that manage to create an inclusive organizational culture have higher productivity and a lower turnover rate" (Gallup 2017) These companies show higher employee loyalty and greater attraction to new talent, which is key to long-term organizational success.

With the development of technology and globalization, the need for inclusive management will continue to grow. Organizations should work to develop strategies that support diversity and ensure equality of opportunity for all employees. One of the ways to achieve this is continuous education and training on diversity and cultural competence, which will prepare leaders for successful management of multicultural teams. In today's work environment, embracing a "growth mindset" is essential to promoting a culture of learning and continuous improvement. (Dweck 2006)

In addition to developing leadership skills, companies should also invest in technology and digital tools that will make it easier to manage diverse teams, especially hybrid and remote teams. Digital communication and progress tracking tools allow employees to stay connected and collaborate, regardless of their geographic distance or work style. Such innovations contribute to the creation of flexible and adaptable working conditions that meet the needs of different generations and cultures. (Westerman 2014)

In conclusion, inclusive management not only enables the successful management of diversity, but also creates opportunities for organizational development. Organizations that are willing to embrace and implement inclusive practices in their culture and structures are more likely to achieve long-term success and prosperity in today's complex and dynamic world. By applying cultural intelligence, empathy and innovative technologies, leaders can create workplaces where diversity is a driver of progress and positive change.

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# COMPULSORY OIL RESERVES OF THE RNM - status and challenges

Anita Stamnova, PhD
Acting director, Central registry of the Republic of North Macedonia,
anita.stamnova@mail.com

Abstract

The supply of crude oil and oil products in the EU is a very important issue, especially for the transport sector and the chemical industry. The concentration of production, the reduction of oil reserves and the increased consumption of oil products worldwide contribute to an increased risk of supply difficulties.

The European Council in the Action Plan 2007 to 2009, within the Energy Policy of Europe, emphasized the need to strengthen the security of the supply of oil reserves to the European Union, as well as to each EU member state, with the aim of oil availability in case of crises. The Energy policy of Europe imposes the need for greater compatibility of the European Community system with the system envisaged by the International Energy Agency.

In accordance with Council Directive 2006/67/EC of July 24, 2006, the obligation of EU member states to keep minimum reserves of crude oil and/or oil derivatives is imposed[1]. Oil reserves are calculated based on the average daily domestic consumption during the previous calendar year. However, reserve holding obligations under the International Energy Program Agreement of November 18, 1974 are calculated on the basis of net imports of oil and petroleum products. For that reason and as a result of other differences in the methodology, the way in which the obligations to keep compulsory reserves and emergency reserves of the EU are calculated, with the directive 2009/119/EC of the Council of September 14, 2009, it is stipulated that the Member States should pass laws, regulations or other administrative provisions by which the stocks of oil reserves until December 31, 2012, will be at a level of at least 90 days of average daily net import or 61 days of average daily consumption in the country, respectively which of the two quantities is bigger.

The Law on Compulsory Oil Reserves of the RSM regulates the obligation to ensure a high level of security of the supply of crude oil and oil derivatives through the creating, storing and maintenance of minimum stocks of crude oil and/or oil derivatives in the form of compulsory oil reserves. the manner and conditions of creation, storage and maintainance of the compulsory oil reserves, introducing the necessary procedures for intervention in order to deal with a severe shortages of oil derivatives in the market and other issues of importance for the compulsory reserves. This Law began to be applied from 01.01.2021 and it partially transposes the Directive 2009/119/EU, compulsory reserves should be formed gradually in order to ensure the total compulsory reserves kept at all times in the Republic of N. Macedonia to correspond to at least 90 days of daily average net imports or 61 days of average daily domestic consumption, in the previous calendar year, depending on which of the two stated quantities is bigger.

The formation of compulsory reserves of oil and oil derivatives is a process of procurement of crude oil and/or oil derivatives and their storage in storage facilities, thus providing conditions for intervention supply to the market with oil derivatives in case of disruption of the energy security of the state caused by large-scale supply disruptions. The central body for keeping oil reserves is the RSM is Compulsory Oil Reserves Agency, which is authorized to establish, maintenance, storage and selling of the compulsory oil reserves. Storage and maintenance of the oil reserves is the responsibility of the trading companies – warehouses keepers, which in their tank capacities should store, keep and replenish crude oil and/or oil derivatives from the compulsory reserves.

[1] *Official gazette L 217, 8.8.2006.,page 8.*

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*Key words: compulsory oil reserves, average daily domestic consumption of oil and oil products, net imports of oil and oil products, action plan for the establishment of compulsory reserves, disruption in the supply of oil derivatives.*

## INTRODUCTION

Availability of oil reserves and security of energy supply are important elements of security for OECD and EU member countries. The Agreement on an International Energy Program Agreement (IEP) was signed in 1974 by several OECD member countries in order to ensure a stable supply of oil in the face of an oil crisis. The IEP envisaged the creation of the International Energy Agency (IEA), an autonomous body operating within the OECD. The IEA sets its own priorities and has independent decision-making structures. In addition to OECD membership, countries wishing to join the IEA as a prerequisite should also maintain substantial oil reserves (90 days of net imports) and be prepared to respond to any major risk of undersupply through oil loans and jointly built measures to deal with the situation in terms of increased demand for oil and oil derivatives. Strategic decisions in the IEA are made by the Management Board, usually by consensus, but majority voting is also possible. The IEA's voting system is primarily based on net oil imports in 1973 and has never been replaced by another calculation method. The IEA is funded primarily by its member states on the basis of their economic power, but also relies on additional inflows of funds from individual member states, as well as funds raised through publications and statistics. The rapid response program to oil shortage emergency constitutes the bulk of the IEP. The IEA deals with risks to the oil supply through the Coordinated Emergency Response Mechanism (CERM), which was introduced in 1984. CERM has been successfully implemented in three cases in the past. The IEA also focuses on other issues, such as: global energy dialogue, encouraging technological development in the energy field, developing closer ties between member governments and finding effective solutions for energy efficiency, combating climate change and dealing with supply risks in various energy sectors.

Cooperation between the IEA and the EU is deepening, given that the two organizations share many common goals, as well as the fact that 20 of the 29 IEA member countries are also EU member states. The IEA is increasingly active in market monitoring of major energy sources for trading (oil, gas, coal and renewables) and regularly advises on policy making and guidance to national governments and at international forums including the G8, G20 and The United Nations Framework Convention on Climate Change. The IEA cooperates closely in the dialogue between producers and consumers, but also among other international bodies in the field of energy, such as the International Renewable Energy Agency and the International Energy Forum. The IEA also works closely with the European Commission and other EU institutions in various areas, including the introduction of new technologies.[2]

Macedonia implements EU directives in the field of compulsory oil reserves in the Law on Mandatory Oil Reserves, but also in the by-laws. The Agency for Compulsory Oil Reserves was established in accordance with the law and is responsible for the establishment, maintenance, storage and sale of the compulsory oil reserves of the RSM.

### Obligation of EU member states to keep minimum reserves of crude oil and/or oil products

The concentration of oil production, the reduction of oil reserves and the increased consumption of oil products worldwide contribute to an increased risk of supply difficulties. The supply of crude oil and oil products in the EU is a very important issue, especially for the transport sector and the chemical industry. 3

[2] *International Energy Agency, Origins and development- IN-DEPTH ANALYSIS, EPRS | European Parliamentary Research Service Author: Alex Wilson Members' Research Service May 2016*
[3] *Directive 2009/119/EU from 14 september 2009*

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In the Action Plan 2007 to 2009, within the "Energy Policy of Europe", the European Council emphasized the need to strengthen the security of the supply of oil derivatives within the European Union, as well as for each EU member state separately, with the aim of availability of oil and oil derivatives in case of crises.

With the Energy Policy of Europe, a greater convergence has been made between the EU system and the system envisaged by the International Energy Agency.

Within the EU member states there are central authorities (CSE) for the management of oil reserves and oil derivatives. In order to allow the Member States to make optimal use of national law to determine the terms of their CSEs, while alleviating the financial burden on end-users arising as a consequence of such stock-holding activities, it is prohibited the use of petroleum reserves for business purposes and it is allowed the reserves to be held in any location in the Community and in any CSE established for that purpose.

EU Member States should ensure the full availability of all oil reserves held in accordance with Community legislation. In order to enable Member States to react quickly in cases of emergency or local crises, they are allowed to use part of their reserves to deal with crisis situations. Emergencies of this type or local crises do not include situations caused by changes in the prices of crude oil or petroleum products, but may include interruptions in the supply of natural gas that would require a change of fuel, that is, the use of crude oil or petroleum products as a fuel for energy production. Reserves that are held in accordance with bilateral agreements or contractual rights to purchase certain quantities of reserves (receipts) should be in compliance with the European Directives.

In order to strengthen the security of supply in the Community, the reserves known as "special reserves", purchased by the Member States or by the CSE and created on the basis of decisions taken by the Member States should correspond to the real needs in cases of crisis. CSEs should have a special legal status to ensure full availability of oil reserves if such a crisis occur. For this purpose, the EU member states should take appropriate measures for the unconditional protection of those reserves.

When emergency reserves and special reserves are mixed with other reserves of economic operators, the amount of reserves intended for emergency situations should be transparently highlighted.

Biofuels and certain additives are often mixed with petroleum products. When they are mixed with petroleum products, it should be possible to distinguish them when calculating petroleum reserves.

A key factor for an efficient response in cases of difficulties in the supply of petroleum products is the appropriate and timely execution of the decisions stipulated in the IEA Agreement. EU member states should put into circulation a part of their emergency reserves to the extent provided by the IEA Decision. The European Commission has close cooperation with the IEA and bases its activities according to the IEA methodology. The European Commission proposes the release of reserves from all member states. In response to an interruption in the uninterrupted supply of oil reserves, Member States are required to respond positively to the Commission's recommendations in the interest of solidarity and unity at Community level (between those Member States that are members of the IEA and those that are not members).

Council Directive 73/238/EEC of July 24, 1973 prescribes measures aimed at easing difficulties in the supply of crude oil and oil products. This directive aims to reduce the negative effects of any temporary or permanent difficulties, which result in a significant reduction in the supply of crude oil or petroleum products including serious disruption of the economic activity of the Community. The purpose of this directive is to maintain a high level of security in the supply of oil and petroleum products in the Community through reliable and transparent mechanisms based on solidarity among EU member states.

Table No. 1 Coverage with compulsory oil reserves expressed in days in EU member states and candidate countries, 31.12.2023

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| State | Coverage in days |
|---|---|
| Belgium | 106 |
| Bulgaria | 82 |
| Czechia | 92 |
| Denmark | 72 |
| Germany | 94 |
| Estonia | 81 |
| Ireland | 86 |
| Greece | 97 |
| Spain | 91 |
| France | 92 |
| Croatia | 92 |
| Italy | 90 |
| Cyprus | 91 |
| Latvia | 80 |
| Lithuania | 93 |
| Luxembourg | 93 |
| Hungary | 90 |
| Malta | 87 |
| Netherlands | 113 |
| Austria | 91 |
| Poland | 100 |
| Portugal | 90 |
| Romania | 95 |
| Slovenia | 95 |
| Slovakia | 97 |
| Finland | 184 |
| Sweden | 112 |
| Macedonia | 51 |
| Albania | 0 |
| Serbia | 42 |
| Türkiye | 0 |

*Source: Eurostat (https://ec.europa.eu/eurostat/databrowser)*

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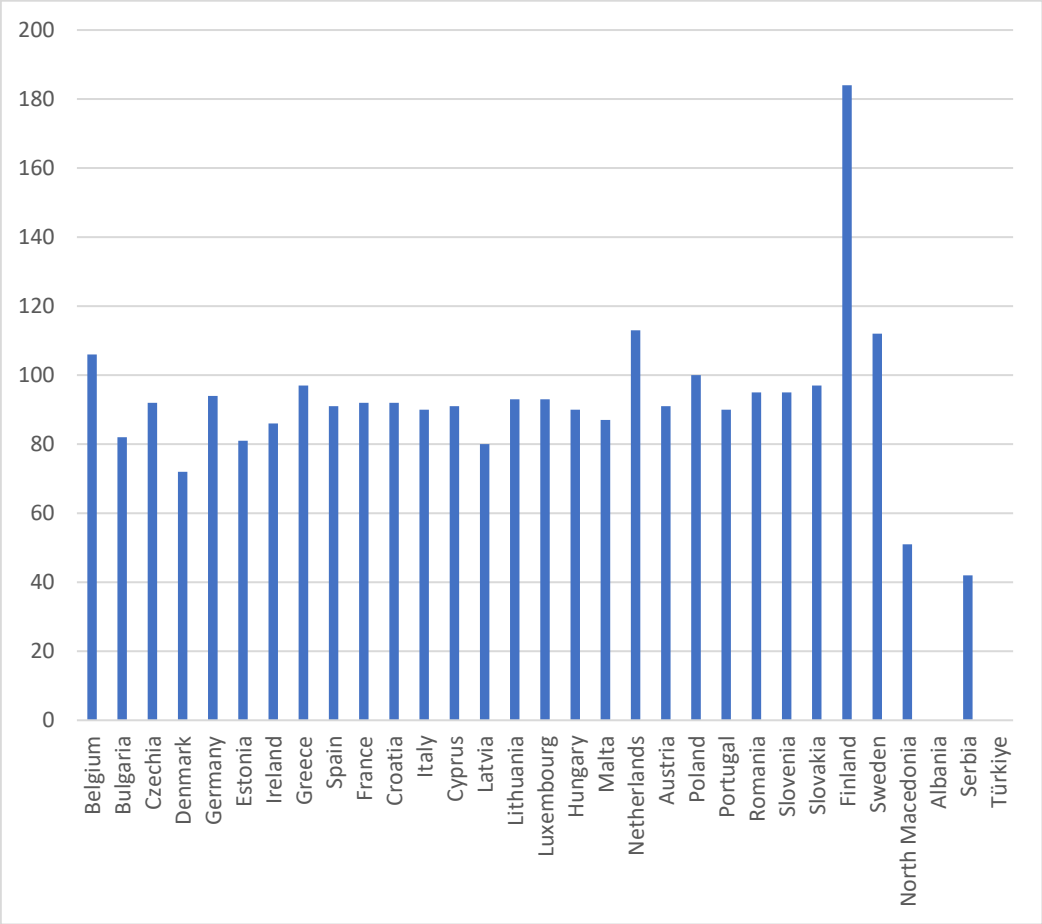
Chart No. 1 Coverage with compulsory oil reserves in days in EU member states and candidates, 31.12.2023




*Source: Eurostat (https://ec.europa.eu/eurostat/databrowser)*

From table no. 1 and graph no. 1 can be concluded that Finland has provided the highest coverage with reserves of oil and oil derivatives (184 days), followed by the Netherlands (113 days), Sweden (112 days) and Belgium (106 days) of reserve coverage.

Table No. 2 Minimum necessary oil reserves for compliance with the EU regulation, 31.12.2023

| State | Stock minimum in thousands of tons |
|---|---|
| Belgium | 3,307 |
| Bulgaria | 1,186 |
| Czechia | 2,065 |
| Denmark | 1,166 |

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| | |
|---|---|
| Germany | 20,266 |
| Estonia | 209 |
| Ireland | 1,792 |
| Greece | 2,933 |
| Spain | 12,071 |
| France | 16,158 |
| Croatia | 702 |
| Italy | 10,549 |
| Cyprus | 570 |
| Latvia | 390 |
| Lithuania | 560 |
| Luxembourg | 613 |
| Hungary | 1,399 |
| Malta | 88 |
| Netherlands | 2,593 |
| Austria | 2,519 |
| Poland | 6,659 |
| Portugal | 2,381 |
| Romania | 1,826 |
| Slovenia | 621 |
| Slovakia | 706 |
| Finland | 1,628 |
| Sweden | 1,886 |
| Macedonia | 310 |
| Albania | 0 |
| Serbia | 676 |
| Türkiye | 0 |

*Source: Eurostat (https://ec.europa.eu/eurostat/databrowser)*

According to the data from table no. 2, it is necessary for Macedonia to acquire another 310.000 tons of oil derivatives in order to achieve full compliance with the EU directives concerning coverage of oil derivatives from the compulsory reserves.

## Compulsory oil reserves in Macedonia

Compulsory oil reserves in Macedonia are established and kept in order to ensure uninterrupted supply to the market of crude oil and/or oil derivatives in the event of impaired energy security caused by an extraordinary disruption and a significant and sudden drop in the supply of crude oil and oil derivatives. The extraordinary disruption of supply can be caused by disruption of the regional market of crude oil and oil derivatives and/or by reasons and conditions whose occurrence cannot be influenced, and occurred on the territory of the RSM and/or in the countries through which imports crude oil and oil derivatives for the needs of the market in the RSM. Compulsory reserves are used in the event of disruption and disturbance in the supply of oil derivatives that may be caused on the market in the RSM.

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Compulsory reserves are also used for the purpose of fulfilling the international obligations of the RSM[4].

Compulsory reserves are formed gradually in accordance with an action plan for the formation of compulsory reserves, in order to ensure that the total compulsory reserves held at any time in the RSM correspond to at least 90 days of daily average net imports or 61 days of average daily domestic consumption in the previous calendar year, depending on which of the two specified amounts is greater. Average daily net imports and average daily domestic consumption for the current calendar year are calculated based on the crude oil equivalent of imports and domestic consumption during the previous calendar year.

The Compulsory Oil Reserves Agency is the authorized institution for the establishment, maintenance, storage and selling of compulsory reserves of the RSM. The Agency is standalone, independent and non-profit legal entity that performs public interest affaires and is the central body for storing the compulsory oil reserves.

**Table 3:** Average daily net imports and average daily internal consumption[5]

| | 2022 | | 2023 | | 2024 | | 2025 | |
|---|---|---|---|---|---|---|---|---|
| | (kton) | (ktoe) | (kton) | (ktoe) | (kton) | (ktoe) | (kton) | (ktoe) |
| daily net import | **2,7** | 2,9 | **2,7** | 2,9 | **2,8** | 2,9 | **2,8** | 3,0 |
| daily consumption | **2,2** | 2,7 | **2,3** | 2,7 | **2,3** | 2,7 | **2,3** | 2,8 |

According to the data from table 3, in Macedonia the daily net imports of oil derivatives are greater than the daily internal consumption, and based on Article 5 of the Low on compulsory oil reserves, it is determined that the level of compulsory oil reserves in the Macedonia will be calculated based on the daily net imports of oil derivatives, that is, the level of oil reserves will amount to at least 90 days of daily net imports of oil derivatives in the previous calendar year.

The Action plan for the establishment of compulsory reserves provides a framework regulation of the dynamics of the formation of compulsory reserves expressed in days of crude oil and/or oil derivatives coverage, the dynamics and the manner of replenishment of the compulsory reserves, arrangement of the storage and territorial distribution of the compulsory reserves, as well as the need and the methods of the investments towards the renewal of the existing and the construction of new storage capacities. The action plan for the period 2023-2025 is in force, according to which the expected days of coverage on 31.12.2025 should amount to 76 days of the average daily net import in 2022, and the quantities of oil derivatives that remain to be procured, in order to fill the anticipated 90 days, are expected to be purchased in tickets during 2025[6].

Compulsory reserves are composed of those oil derivatives whose common share in the total domestic consumption in the previous calendar year is at least 75%. The share of oil

[4] *Low on compulsory oil reserves („Official Gazette of the Republic of Macedonia" no. 144/14, 178/14, 199/15, 197/17, 07/19 and „Official Gazette of the Republic of North Macedonia'' no. 275/19, 150/21, 236/22 and 147/24")*

[5] *Action plan for the establishment of compulsory reserves 2023-2025, Official Gazette of the Republic of North Macedonia no. 33/23*

[6] *Action plan for the establishment of compulsory reserves 2023-2025, Official Gazette of the Republic of North Macedonia no. 33/23*

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derivatives in the total amount of compulsory reserves is determined based on the individual shares in the total domestic consumption in the previous calendar year.

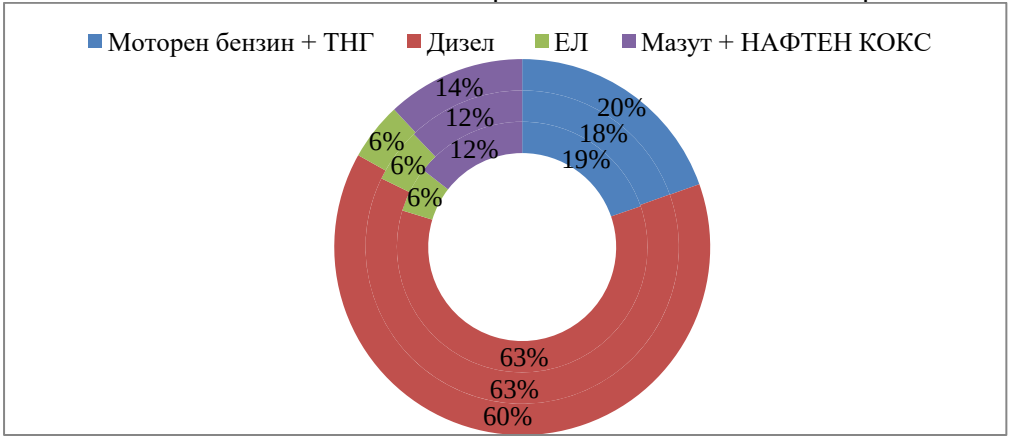
Compulsory reserves that are kept in the form of finished products are composed of one or more types of oil derivatives classified in the following categories:

- light distillates or light oil derivatives (liquid petroleum gases LPG-butane, propane and a mixture of butane and propane, all types of motor gasoline and aviation gasoline),

- middle distillates or middle oil derivatives (all types of diesels for cars, gas oil or Extra Light 1 (EL-1) and kerosene) and
- heavy distillates or heavy oil derivatives (all types of fuel oil) and others (bitumen and petroleum coke).

Motor biofuels, as well as additives, are taken into account when calculating the actual quantities of the compulsory reserves that are kept if they are mixed in the specific oil derivatives according to the technical specifications. Compulsory Oil Reserves Agency in order to fulfill the obligation to establish compulsory reserves, can conclude tickets with which third parties commit themselves for a certain price to reserve certain quantities of crude oil and/or oil derivatives according to predetermined criteria in a certain period of time. The Agency has not concluded contracts for tickets in the entire period from its establishment until today.

Chart No. 2 Structure of the consumption of oil derivatives in the period 2020-2022




*Source: Action plan for the establishment of compulsory reserves 2023-2025, Official Gazette of the Republic of North Macedonia no. 33/23*

According to the data from Chart No. 2, the structure of the compulsory oil reserves of Macedonia consists of four types of oil derivatives whose common share in the total domestic consumption is at least 75%, namely: Motor gasoline Eurosuper BS - 95, Diesel Eurodiesel BS (D- E-V), EL-1 Extra Light oil and Fuel oil M-1 NS.

The share of each individual oil derivative that is kept in the compulsory reserves is determined based on the individual shares of each oil derivative in the total domestic consumption in the previous calendar year. Table 4 shows the percentage share of each oil derivative in the compulsory oil reserves of Macedonia.

**Table 4:** Structure of oil derivatives in compulsory reserves (in %)

| Type of oil derivative | Quantity | Participation |
|---|---|---|
| Motor gasoline | 32.132.281 liters | 18% |

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| | | |
|---|---|---|
| Diesel | 115.889.077 liters | 64% |
| EL-1 | 10.772.019 liters | 6% |
| Fuel oil | 21.576.589 kilograms | 12% |
| **Total** | | **100%** |

*Source: Action plan for the establishment of compulsory reserves 2023-2025, Official Gazette of the Republic of North Macedonia no. 33/23*

As can be seen from the table above, diesel has the largest consumption of oil derivatives in Macedonia with share of 64%, followed by gasoline with a share of 18%, fuel oil with 12% and extra light oil EL-1 with a share of of 6%.

**Table 5:** Predicted level of compulsory reserves on 31.12.2025 (in kton)

| **Type of oil derivative** | **Predicted/expected level of reserves on 12/31/2025** |
|---|---|
| Motor gasoline | 24,2 |
| Diesel | 125,9 |
| EL-1 | 14,1 |
| Fuel oil | 21,5 |
| **Total** | **185,7** |

*Source: Action plan for the establishment of compulsory reserves 2023-2025, Official Gazette of the Republic of North Macedonia no. 33/23*

Table No. 5 shows the predicted level of reserves by individual oil derivatives in ktons. As can be ascertained from the table itself, the largest amounts of the compulsory oil reserves are expected to be procured for diesel, because this derivative has the highest consumption in Macedonia.

**Table 6:** Level of compulsory reserves for the period 2023-2025 (in kton)

| **Type of oil derivative** | **Realized** | **Anticipated/expected to** | |
|---|---|---|---|
| | **Reserve level in 2022** | **Planned for procurement in the period 2023-2025** | **Reserve level in 2025** |
| Motor gasoline | 24,2 | 0 | 24,2 |
| Diesel | 97,9 | 28 | 125,9 |
| EL-1 | 9,1 | 5 | 14,1 |
| Fuel oil | 21,5 | 0 | 21,5 |
| **Total** | 152,7 | 33 | 185,7 |

*Source: Action plan for the establishment of compulsory reserves 2023-2025, Official Gazette of the Republic of North Macedonia no. 33/23*

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Table no. 6 shows the level of reserves by separate oil reserves and in total on 31.12.2022, the anticipated purchases in 2023, 2024 and 2025 and the level of reserves on 31.12.2025. From the table, it can be seen that in the period 2023-2025, the purchase of diesel is only expected in quantities of 28 ktons for the three years in total.

**Table 7:** Days of coverage until 31.12.2022, number of days for which oil reserves are provided

| Type of oil derivative | Reserve level (kton) | Reserve level (ктое) | Daily net import (ктое) | Days of coverage |
|---|---|---|---|---|
| TNG | 0 | 0 | 0,1 | 0 |
| Motor gasoline | 24,2 | 25,7 | 0,2 | 100 |
| Jet fuels | 0 | 0 | 0,4 | 0 |
| Diesel | 97,9 | 104,2 | 1,8 | 55 |
| EL-1 | 9,1 | 9,6 | 0,9 | 78 |
| Fuel oil | 21,5 | 22,8 | 0,2 | 89 |
| Petroleum coke | 0 | 0 | 0,4 | 0 |
| Others | 0 | 0 | 0,1 | 0 |
| **Total** | **152,7** | **162,6** | **4,1** | **57** |

*Source: Action plan for the establishment of compulsory reserves 2023-2025, Official Gazette of the Republic of North Macedonia no. 33/23*

Table no. 7 shows the quantities of oil reserves by individual derivatives, as well as the days of coverage on 31.12.2022. Motor gasoline has the highest coverage of 100 days, followed by fuel oil with 89 days, extra light 78 and diesel which has the least days of coverage, i.e. 55 days.

In the reports of the European Commission for 2019, 2020, 2021, 2022 and 2023 from the screening process - Cluster 4 Green Agenda and Sustainability - Chapter 15 Energy, it is stated that the coverage of oil derivatives from the compulsory reserves in days is as follows: in 2019 coverage of 63 days from the average daily consumption, 2020 coverage of 74 days, 2021 coverage of 51 days, 2022 coverage of 54 days and 2023 coverage of 53 days from the average daily consumption of oil derivatives. It should be noted that in 2021 the new Law on Compulsory Reserves entered into force, which in accordance with EU directives in this area changed the way of calculating of coverage days. Due to the changed method of calculation, 2021 has shown fewer days of coverage with oil derivatives compared to the previous year 2020. The days of coverage in 2023 amount to 53 days and are one day less than in 2022, which is the result of the input elements in the calculation, i.e. the increased import of certain oil derivatives during 2023.

The Compulsory Reserves Agency can also keep reserves of oil derivatives in the form of specific reserves that are an integral part of the compulsory reserves and they are kept in order to enable appropriate intervention by releasing oil derivatives. This is necessary for the initial response in cases of special urgency or to overcome local crises that are not caused by changes in the prices of crude oil or oil derivatives and may also refer to interruptions in the supply of natural gas.

Specific reserves may be composed of one or more types of oil derivatives, namely: Ethane, LPG, Motor gasoline, Aviation gasoline, Gasoline jet fuel (naphtha- type jet fuel or JP4), Kerosene-type jet fuel type, other kerosene, Gas oils / diesel oil (Extra light oil 1 (EL-1)

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and diesel), Fuel oil (with high sulfur content and with low sulfur content), Mineral turpentine ("White spirit") and SBP, Lubricating Oils, Bitumen, Paraffin Waxes and Petroleum Coke. In the entire period from the adoption of the legal regulation for the establishment of compulsory reserves, no specific reserves have been established in the country due to the fact that the compulsory state reserves of oil derivatives have not yet been established in accordance with the Law on Compulsory Oil Reserves and EU directives.

The funds intended to cover the costs of establishing, storing and maintaining mandatory reserves as well as for the daily operation of the Compulsory Reserves Agency are provided by: the fee for compulsory reserves of crude oil and/or oil derivatives; funds obtained on the basis of international cooperation of programs and projects; loans and other sources. The persons who are under the obligation for payment of the fee for compulsory reserves are: producers of oil derivatives and importers of oil derivatives.

**Table 8:** Total planned funds for the implementation of the action plan in the period 2023-2025 (in millions of euros per year)

| | **2023** | **2024** | **2025** | Total |
|---|---|---|---|---|
| For the purchase of oil derivatives | 14,186 | 14,201 | 14,201 | 42,588 |
| For storage анд maintenance | 5,812 | 6,202 | 6,593 | 18,607 |
| For current operation of MAKORA | 0,5 | 0,5 | 0,5 | 1,5 |
| Total | 20,498 | 20,903 | 21,294 | 62,695 |

*Source: Action plan for the establishment of compulsory reserves 2023-2025, Official Gazette of the Republic of North Macedonia no. 33/23*

If compared the approved funds in the budget of the Compulsory Oil Reserves Agency with the planned funds in the Action Plan 2023-2025, it can be concluded that less funds have been approved than planned. The provided funds in the budget of the Agency for filling the compulsory oil reserves is as follows: 19,986 million euros in 2023 or 512.000 euros less than the planned funds in the action plan, 13,259 million euros in 2024 or 20.890 euros less than the planned funds. The planned purchases of certain quantities of derivatives for the compulsory reserves in the action plan have not been fully realized due to the fact that the planned funds have not been secured according to the action plan in 2023 and 2024. Moreover, have to be taken into consideration the growth in the prices of oil derivatives in the period from the adoption of the action plan until today, which indicates the fact that more funds are needed than originally planned for the procurement foreseen in the action plan 2023-2025. Of course, the necessary funds for the purchase of tickets, which according to the action plan should cover a period of 14 days, should also be taken into account.

## CONCLUSION

Compulsory oil reserves are established and maintenance in order to ensure uninterrupted supply to the market of crude oil and/or oil derivatives in the event of disturbed energy security caused by a major disruption and a significant and sudden drop in the supply of crude oil and oil derivatives to the market.

Global Strategic Petroleum Reserves (GSPR) refers to crude oil held by a country's government, as well as private industry, to protect the economy and help maintain national security during an energy crisis. Strategic reserves are intended to be used to cover short-term supply disruptions.

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In 2004, about 4.1 billion barrels (650,000,000 m3) of oil constituted the strategic reserves of the member countries of the International Energy Agency, of which 1.4 billion were controlled by national governments and the rest by the private sector. The strategic oil reserves of the United States are consistently the largest compared to other member countries of the International Energy Agency.

EU member countries are obliged to maintain compulsory oil reserves at the level of 90 days of daily average net imports or 61 days of average daily domestic consumption, in the previous calendar year, depending on which of the two specified quantities is greater. Compulsory oil reserves can be used in the event of a supply disruption to the market. According to the available Eurostat data, oil constitutes 37% of the EU's energy mix in 2022. Although the transition to alternative energy sources is underway, EU countries are still dependent on the import of crude oil and oil derivatives. It is therefore essential to maintain certain quantities of stocks of oil derivatives to be used in the event of interruptions in the supply of oil. Member countries analyze the risks of oil supply interruptions and introduce crisis management procedures to be able to react in the event of an oil crisis. During a supply crisis, the European Commission is responsible for organizing consultation between EU countries. The EU is also in coordination with the oil reserves system of the International Energy Agency.

Compulsory oil reserves in Macedonia are kept according to a law that is in line with the EU directives that regulate this area. The days of coverage with oil products in 2023 amount to 53 days, which means that in order to achieve a coverage of 90 days of the average daily net import as foreseen in the 2023-2024 action plan, it is necessary to procure oil derivatives in quantities that would cover another 37 days, that is, about 70% of the existing reserves available to the state. It should be taken into account the fact that the currently available compulsory oil reserves have been procured in the period from the establishment of the Compulsory Oil Reserves Agency until today, i.e. in a period of 14 years. In order to complete compulsory reserves at the dynamics at which they have been procured so far, a period of about 7 years will be required.

According to the Law on Compulsory Oil Reserves, it is foreseen that the Macedonian government will form the compulsory oil reserves by December 31, 2022 at the latest. This means that the legal deadline for the formation of reserves has already passed and it is necessary to complete them in the shortest possible time. It is necessary to make efforts to ensure sufficient funds for the completion of compulsory oil reserves in one of the ways indicated in the law. The compulsory reserves could be complete: by increasing the fee for compulsory reserves of crude oil and/or oil derivatives which is paid when importing oil derivatives, with funds obtained on the basis of international cooperation of programs and projects, credits and other sources.

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# THE ROLE OF STANDARDIZATION IN THE FOOD INDUSTRY

**Dushica Popova[1*], Natasha Miteva[2]**
*[1]Assistant professor, Faculty of tourism and business logistics, Goce Delcev University, Stip, R. N. Macedonia,* dusica.saneva@ugd.edu.mk
*[2]Associate professor, Faculty of tourism and business logistics, Goce Delcev University, Stip, R. N. Macedonia,* natasa.miteva@ugd.edu.mk

## Abstract

Standardization and the implementation of standards are vital in the food industry and ensure safe and quality products, increasing the customers' loyalty. Furthermore, the process has a great role in the promotion of economic stability. The standards implementation process enables safer food products, improved operational efficiency and greater accountability within the food industry. As the global food supply chain becomes more complex, the importance of these standards is greater. The most common standards implemented in the food industry are ISO 22000, HASSP, GMP, etc. By introducing these standards, organizations improve their food safety practices, but also meet the needs of the customers.

Standardization is a legal requirement, builds trust in food products and increases market stability. Standardized products save time, energy and money, and increase competitiveness and consumers' loyalty.

**Key words:** *standards, food, quality, safety*

**JEL Classification: L15, L66**

## INTRODUCTION

Standardization is the process of establishing and implementing technical standards to ensure consistency and quality between services, processes and products. The introduction of standardization achieves the creation of goods of the same type that comply with a common standard, allowing those goods to share basic characteristics and quality. Standardization and the development of the standards are based on consensus between various stakeholders, including various organizations, regulatory bodies and users.

The main objective of the standards is to increase safety, efficiency and effectiveness by improving the quality of products and processes, and to reduce the costs of production and services. Standardization and the introduction of standards reduce the occurrence of risks associated with products and services, especially in industry, and ensure uniformity in quality by meeting specific criteria for them too. It also provides easier and more efficient management of processes and facilitates domestic and international trade by increasing profits of manufacturers, with the guarantee that products meet common, generally accepted international standards.

With the standard implementation provides standardized sizes and specifications for elements, which facilitate assembly and competence in the production process, while standards in the food industry ensure food quality and safety with precisely defined permissible values of additives and other food components.

## STANDARDS IN FOOD INDUSTRY

The standards in the food industry ensure quality and safe food products starting from food production, processing, packaging and distribution by introducing basic regulations and guidelines established by international organizations and bodies. The standards cover all aspects of food production from starting raw materials to the final product, its packaging and its distribution.

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The introduction of standards is essential, because the primary goal is to protect consumers from consuming contaminated food, and thus from disease. By adhering to standards, the food industry reduces the risk of developing epidemics that can seriously lead to serious health problems. Compliance with food safety standards help organizations avoid legal consequences, and their non-compliance can lead to large fines and impaired consumer confidence, and even the closure of the industry, large fines, lawsuits and damage to reputation. The very introduction and compliance with standards by the organization increases consumer confidence, making them more likely to trust them and buy their products.

The most common and widespread standards used in the food industry are ISO 22000 (a standard that describes the requirements of a food safety management system), HASSP (a system for hazard analysis and critical control points that identifies potential hazards in food production and establishes critical control points), Good Manufacturing Practice (a standard for increasing the safety of all processes in the production of products under desired conditions and systems for the production of products that directly affect human health), etc.

## IMPACT OF STANDARDS ON FOOD SAFETY

The introduction of standards minimizes the diseases transmitted by contaminated food and that stands for one of its basic principles. By establishing guidelines for the safe handling, processing and storage of food, standards help minimize the risks of contamination. Food safety standards contribute to better public health and economic stability. By reducing the level of foodborne diseases, these standards ease the burden on the health system and improve its productivity.

Furthermore, safe food increases consumers' confidence since standards build trust in food products, essential for market stability. Consumers are more likely to buy products from brands that foster the safety of their products, which increases consumers' satisfaction and brand loyalty.

The compliance with food safety standards is not just a best practice, but it is often a legal requirement. Failure to comply can lead to serious consequences, including fines and product recalls. The financial burden of a food safety violation can be significant, affecting the company's overall result and its long-term sustainability. Standards also facilitate international trade by ensuring that products meet safety requirements across borders.

Adherence to standards and standardization for food safety opens new markets for an organization, especially in international trade. Many countries require compliance with specific safety standards for imported food products, which increases a company's competitiveness in the global market, allowing them to reach a wider range of customers. The implementation of food safety standards often leads to improved operational processes. Businesses that adopt these standards typically streamline their operations, reduce waste, and improve overall efficiency. All of this results in cost savings and better resource management.

The introduction of standards provides traceability throughout the food supply chain, i.e. if a food safety problem occurs, it is easier to find the source of contamination through standard operating procedures (SOPs). In order to introduce standards, and thus achieve the required level of quality, it is necessary to define and standardize the course of activities with a standard operating procedure or procedure. Standard operating procedures and standards are essential components of effective organizational management and each of them has different, but also interconnected roles. Standard operating procedures are detailed and written instructions that describe how to perform specific tasks or processes within the organization. They aim to ensure consistency, quality and efficiency in operations. Improved traceability not only helps in the effective management of recalls, but also holds organizations accountable for their practices, fostering a culture of accountability.

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## CHALLENGES IN IMPLEMENTING STANDARDS

Implementing standards is very useful and essential, but it also it brings several challenges. The process often requires significant investments in equipment, machinery, processes and training. For small businesses, these costs can be prohibitive, making it difficult to achieve compliance. The complexity of standards requires understanding them and can vary depending on the type of industry, its size and the type and quantity of products. Managing standards can be a problem, especially for small businesses without trained and dedicated compliance teams.

Moreover, some organizations, especially the smaller ones, may not have enough employed staff to implement the standards and to ensure their compliance with food safety standards, which is a problem that leads to gaps in knowledge and practice. Employees and management in organizations can also resist changes to already established processes, especially if they think that the introduction of new standards is difficult, and therefore training and effective communication are needed. Food safety standards are constantly updated to respond to new research and technologies, so continuous investment in training, education and adaptation is necessary. Gaps in supply chains can compromise the entire system, making it essential for businesses to thoroughly check their suppliers, and thus ensure that suppliers also meet the standards.

Standardization and standards themselves require extensive and extensive documentation and time-consuming record-keeping, which is particularly time-consuming for smaller operations with limited administrative resources. Some organizations may lower their cost compliance thresholds in order to create an uneven playing field in highly competitive markets, and this can put pressure on businesses to compromise on standards in order to remain competitive. Of course, the most important thing is that while the challenges of implementing food standards can be significant, the benefits often outweigh the difficulties, so through strategic planning, training and investment, organizations can improve their food safety practices and ultimately protect their consumers and their products.

## FUTURE TRENDS

The introduction of standards and standardization allows for the harmonization of food standards and allows for an increased focus on sustainable practices within them. Standards are developed to promote sustainable sourcing practices in order to reduce carbon pollution by raising environmental awareness and increasing demand for plant-based foods, safety and quality standards are adapted to this type of food in order to satisfy consumers.

With the increase in health awareness among consumers, there is a trend towards stricter food labelling and declaration, therefore the standards themselves will need to be developed in that direction in order to address issues of overall nutritional value. Also, functional foods, i.e. foods that provide health benefits beyond basic foods, are increasingly present on the market.

As trade and commodity prices develop and global trade grows, steps will be taken to harmonize food safety standards across countries to ensure consistent safety measures. Future standards will focus on clearer declaration practices that include the origin of ingredients as well as production methods in order for organizations to be more transparent to consumers.

Climate change or pandemics pose new threats to food safety, and therefore quality standards in the future need to be flexible and responsive, and this includes greater education of consumers about food standards.

## CONCLUDION

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The implementation of standards is crucial for the development of organizations and for gaining consumer confidence. By investing in standards, organizations can grow and be competitive in the market. The implementation of standards in the food industry is a strategic move that improves product sales, but also guarantees their safety and quality. Implementation enables continuous improvement, which improves both processes and the quality of their outcome. Standardization enables consistency in meeting the established standards and continuous fulfillment of tasks, which enables process compliance and quality maintenance. Standards in the food industry set quality, define product safety and are of vital importance for greater consumer confidence. As the food industry develops and modernizes, the importance of introducing standards will increase, because there cannot be an industry without established standards that guarantee safe and quality products.

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# THE IMPORTANCE OF THE PLANNING FUNCTION IN THE BUSINESS FINANCIAL DECISION-MAKING PROCESS IN TOURISM ENTERPRISES

**Zlatko Jakovlev[1], Vladimir Kitanov[2]**
[1]проф. д-Златко Јаковлев, Универзитет „Гоце Делчев“ – Штип, Факултет за туризам и бизнис логистика - Гевгелија
[2]проф. д-р Владимир Китанов, Универзитет „Гоце Делчев“ – Штип, Факултет за туризам и бизнис логистика - Гевгелија

**Abstract**

Planning is an introduction to selecting findings and goals, and the first activity to successfully implement the above. The result of the planning process is the plans. Many elements that go into the plans, before being taken for consideration, should be selected in detail. Plans are made for different intervals. They strongly imply not only new ideas but also sensitivity, equipment in the workplace and so on. It should be apostrophed that the plan is a means of action and a way to achieve the goal. If planning is efficient, it can also be expected to be successfully implemented.

**Key words: tourism, finance, goals, plans, efficiency, effectiveness**
**JEL classification: G3, Z3**

## 1. Introduction

To explain the concept of planning in tourism and to understand its essence, it is necessary to start from the nature of man as a conscious being. Every person in their daily life tends to anticipate the consequences of their current actions. His actions are always predetermined by considerations of events that may or are expected to occur in the future. At the same time, he seeks to influence future events based on his own needs and desires. Therefore, he sets goals that he strives to achieve within a certain period of time, thinks about possible methods to achieve them, and chooses the means to best achieve them. With it, individuals think about the future, make decisions, and take action. Planning means mentally bridging the gap between the present and future states, judiciously linking what is to be done with what is to be achieved. It permeates all human activities, in his personal and business life.

## 2. Theoretical and Methodological Approach to Research

For any empirical research to be carried out effectively, it is necessary to first develop a research project. The research project encompasses several main stages:

- Determine the purpose and subject of the research;
- Hypothesis;
- Sample selection (sample selection);
- Development of methodological instruments for field data collection;
- On-the-ground data collection;
- Data processing;
- Interpretation of the data, i.e. the design of the study.[1]

[1] Todorović, A., (1978), Metodologija istrazivanja slobodnog vremena, Savremena Administracija – Beograd, Beograd, 51, изнесено според Бунташески, Б., (1994), Социо - психолошки проучувања на активностите на посетителите во туристичкото место, Просветно дело - Скопје, Скопје, 52.

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### 2.1. Objectives of the study

This research has a scientific and practical purpose. The scientific objective refers to the specific theoretical knowledge about the significance of the planning function and the consideration of the implications of planning in the financial decision-making process in tourism enterprises, and the practical objective is related to the specific implementation of the theoretical knowledge in practice.

#### 2.1.1. Scientific objective

The scientific objective is to uncover certain theoretical insights by taking into account the implications of planning in the financial decision-making process of tourism enterprises. The scientific aim of this research is to uncover new insights into how if planning considerations are taken into account in the financial decision-making process of tourism enterprises, rapid tourism development will be ensured. Namely, through the method of analysis, through a survey with managers, we determined the representation of planning instruments in the financial decision-making process of enterprises in the field of tourism.

#### 2.1.2. Practical objective

This research also has a practical purpose, which is closely related to the scientific purpose. It is related to a particular implementation of theoretical knowledge in practice. The practical objective of the research is to implement the discovered theoretical knowledge about the representation of planning instruments in the process of financial decision-making, which will contribute to the dynamic development of tourism enterprises, and thus tourism. Therefore, the practical objective of this research has broad dimensions, as it should mobilize all factors that are directly and indirectly involved in tourism, i.e. are interested in this issue.

### 2.2. Subject of the study

The subject of research in this paper is the importance of the planning function and the use of planning input in the financial decisions of enterprises in the field of tourism. The subject of this research analyzes three concepts that need to be operationalized:

- planning,
- financial decisions, and
- tourism enterprises.

#### 2.2.1. Planning

Etymologically, the term planing derives from the Latin word planum, meaning flat surface. It has long been used in architecture and construction to express the preparation of a sketch, draft, or plan of a building structure. However, its content is far broader and more complex. It can be argued that there is no universally accepted definition in theory that can explain the essence of planning. There are a number of definitions in which authors express their views on planning, starting from different aspects of consideration. This is especially true for business planning in tourism enterprises.

Planning is a primary function in tourism management. Planning is a process that involves the selection of goals and objectives as well as actions to achieve them, as well as decision-making, i.e. the choice of alternative courses of action. Plans provide a rational approach to achieving pre-selected goals. Planning has the task of the tourism company to provide: to know why it exists and what is its basic area of activity, to know which are its good and which are its bad sides, to know what conditions and threats come from the external environment, to be able to recognize and incorporate adequate standards of operation and to have defined rules of conduct (policy) to be followed by all employees in order to achieve the goals of tourism enterprise.

#### 2.2.2. Financial decisions

Financial decisions include investment decisions, then strategic financial decisions, and finally tactical financial decisions. In order to prepare an investment decision for the

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successful operation of enterprises in the field of tourism, it is necessary to make an investment project that contains numerous interdependent and related activities. Investing is the exchange of available assets for expected future returns. One of the key reasons why businesses fail is the lack of money to settle obligations. In other words, businesses fail to maintain a steady cash flow. Also, financial institutions such as banks will ask first and first ask of a tourism company is what its cash flow is. Cash flow is an overview of the inflows and outflows of money in a business. It's a two-way process – cash inflows and outflows. What needs to be done is to effectively manage both suppliers (cash outflow) and buyers (cash flow).

Cash flow forecasts, capital budgeting, cost of capital, and risk are important in investment deferrals because they provide information about how much money should be provided for the tourism business. Usually, these forecasts/projections are made on a monthly basis. Also, to the extent that a tourism company has a positive cash flow for years, there is a big plus for banks to realize a line of credit.

The decision to invest is the wisest decision of every individual, every family, every enterprise, and especially in the field of tourism. Simply put, if we don't put everything we have earned into the right investment, i.e. the money that a tourism company puts in today, will bring in additional income tomorrow. All that is required is that the money saved, regardless of its amount, is invested with a clearly defined goal that will ultimately bring profit to the tourism enterprise. All investments with a maturity of more than one year are called long-term investments. Making long-term financial decisions is a complex and time-consuming process that is determined by the following factors: savings, interest rates, and expectations.

The term capital has several interrelated meanings in economics, finance, and accounting. In finance and accounting, capital generally refers to financial wealth, especially that which is used to start and maintain a business. The dividend policy is part of the tourism company's financing decision. The dividend payout ratio indicates how much of the profit can be retained in the company as a source of funding.

The existence of an enterprise in the field of tourism and in any field in general cannot be imagined without a good management structure. Behind the success of any enterprise, and in this context in tourism, is a successful management team. Management teams are the key subjects for making tactical financial decisions in a tourism enterprise. Tourism managers behave in accordance with managerial roles to accomplish management functions. Every tourism manager needs to know how to perform their tasks, to know how to organize the rest of the employees and, ultimately, to successfully perceive the results of the work. In contrast to strategy, financial tactics are the concretization of strategy, and it differs in that it is adaptable, quick to use results, corrects mistakes, and changes its own goals, but still stays within the framework of strategic goals.

### 2.2.3. Tourism Enterprises

Management is very important because the existence of the tourist enterprise and its activity depends on it, which is very important, both for a national economy such as the Republic of Macedonia and beyond. In today's industrialized society, complex technologies dominate and it is the organization that connects people, knowledge, and raw materials to perform tasks that no single individual can perform alone. It can be pointed out that management is a very important, and often often decisive factor for a successful business in today's turbulent working environment. In this connotation, the importance of professional management is emphasized. More specifically, it means that professional management is not carried out by the entrepreneur (the owner of the capital), but by engaged professional managers. Peter Drucker believes that in today's turbulent economic conditions, management is the basis and factor for the successful business of any enterprise, especially in tourism. It is inevitable when the firm reaches a certain volume of activity. When an entrepreneur needs to move from a management system to professional management, the critical point is 300–1000 employees,

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depending on the degree of complexity and differentiation of his work, as well as the ability of the entrepreneur. The main preoccupation of managers is to ensure the growth and development of the enterprise, and this means to achieve its business and development goals.

The importance of tourism management lies in the need for effective functioning of the tourism enterprise in the Republic of Macedonia. More specifically, it means achieving goals in an effective and efficient manner. Efficiency is the degree to which a tourism company achieves its goals. Essentially, it means whether the firm succeeds in achieving the goals that have been set in advance, or whether it means providing tourism products and services that consumers will value. From the above, it can be pointed out that efficiency is the achievement of the tasks of the enterprise qualitatively and quantitatively, including the characteristics of the output i.e. the end results.

### 2.3. Hypotheses

One of the most important issues in empirical research is hypothesis formulation and verification. "It is a claim that can be put to the test to prove its worth. The hypothesis may appear to be contrary to or consistent with conventional wisdom. It can be proven whether it is true or incorrect. In any case, it leads to empirical inquiry. Whatever the outcome, the hypothesis is a question, posed in such a way that some kind of answer can be obtained. It is an example of organized skepticism of science, a refusal to adopt any claim without empirical verification".[2] Each hypothesis shows the relationship between independent and dependent variables.[3]

#### 2.3.1. General hypothesis

**The planning function is important in making quality financial decisions regardless of the size of the enterprise, its organizational structure, and the type of activity.**

#### 2.3.1.1. Special hypothesis

**A separate hypothesis is that the tourism company takes into account the inputs of planning in part to the financial decision-making by management.**

### 2.4. Research methods and organization

#### 2.4.1. Research methods

In the study of social phenomena, general and specific methods are used. "All the social sciences, in addition to general methods, apply and use special and specific methods that are appropriate for collecting data in the appropriate field".[4] Hence, this research is based on a particular methodology. In processing the data obtained from the study, we applied the method of analysis and the method of synthesis.

#### 2.4.1.1. Method of analysis

[2] Gud, V., Het, P, (1966), Metodi socijalnog istraživanja, Beograd, 56 - 57, изнесено според Бунташески, Б., (1994), Социо - психолошки проучувања на активностите на посетителите во туристичкото место, Просветно дело - Скопје, Скопје, 55.

[3] Бунташески, Б., (1994), Социо - психолошки проучувања на активностите на посетителите во туристичкото место, Просветно дело - Скопје, Скопје, 55.

[4] Todorović, A., (1978), Ibid, 58.

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The term "analysis" comes from the Greek word >>analysis<< which means the dismemberment of a whole into its constituent parts.[5] Thus, parsing is a fundamental feature of the method of analysis. In fact, dismemberment means the separation of a complex object into the parts of which it consists in order to perceive their qualities, determine the quality of the complex object, and indicate their effect on it.[6] Namely, on the tabular data, we applied a breakdown of their content and gave an explicit explanation.

**2.4.1.2. Synthesis method**

The synthesis method is the process of scientifically investigating and explaining reality and by means of synthesizing simple judgments into more complex ones. Synthesis is the process of generalization in which all more abstract terms arise compared to previous terms. Synthesis is a way of systematizing knowledge according to the regularity of formal logic, as the process of creating theoretical knowledge in the direction of the particular to the general, i.e. from the species to the genus. All the findings obtained through the method of analysis, using the synthesis method, we turned them into conclusions from which we further gave recommendations for improving financial planning in tourism enterprises.

**2.4.2. Methodological research techniques**

In the defined object of research as methodological techniques we used:

- Questionnaire
- Scaling method and
- Statistical method.2.4.2.1. Анкета

We applied the survey to managers in several enterprises in the field of tourism. It aimed to get a clear picture of their views, in terms of whether planning inputs are taken into account in financial decision-making.

**2.4.2.2. Scaling method**

**This method is used to obtain data from multiple survey questions. We applied scaling to activate opportunities to take into account the inputs of planning in financial decision-making. In formulating the degrees, the statistical processing of the data was taken into account, which was the next step.**

**2.4.2.3. Statistical method**

**In this study, this method is used because it achieves greater accuracy in the study of phenomena. We used the following statistical technique: calculating percentages. Statistical processing of the data is done by computers.**

**2.4.2.4. Specimen design and selection**

In the design and selection of the sample, consideration was taken into account. Representation depends on the size and manner of its acquisition. The sample size depends on the number of subjects taken for examination. In addition, the sample must contain at least 100 members of the population in order to make reliable statistical conclusions.[7] In this context, this survey surveyed 200 tourism managers.

[5] Стојановиќ, Т., (1990), Анализа на работењето на претпријатијата, Сојуз на сметководствените и финансиските работници на Македонија - Скопје, Скопје, 21.
[6] Стојановиќ, Т., (1990), Ибид, 156.
[7] Бунташески, Б., (1994), Ибид, 60.

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**2.4.2.5. Implementation of the research**

**This phase of the study was operational. The survey was carried out in the time period from June 2018 to September 2018 in a number of enterprises in the field of tourism. From the management team of the tourism companies we have come across full understanding and assistance.**

## 3. Analysis of the resulting research data

**This section is the most important part of the paper and is actually the final stage of the research. As we have pointed out, using the method of analysis, we also analyzed the obtained empirical data from the survey of managers in several tourism enterprises, after systematizing them, tablating, determining the number of respondents, calculating the percentage according to the number of respondents.**

### 3.1. Respondents' views on the prevalence of the use of planning inputs for quality financial decision-making in tourism enterprises

As we have pointed out earlier, the basis of this research is the analysis of the empirical data obtained from the survey of managers in several tourism enterprises, after we systematized, tabulated, determined the number of respondents and calculated the percentage according to the number of respondents. In that connotation, on the tabular data presented and on the basis of respondents' responses, we applied a breakdown of their content and gave a precise explanation. Accordingly, the separate hypothesis reads: "It is assumed that the tourism company partially takes into account the inputs of planning in financial decision-making by management."

Table 1 presents the respondents' views on taking into account the inputs from planning in financial decision-making by management in the firms where they have established their employment relationship, which were realized through a survey.

The planning function of tourism enterprises in the Republic of Macedonia is one of the key steps in making a profit. This feature traces the path to the desired goals of the tourism enterprise in a specified period of time. The goal of the financial planning function is to deliver quality outputs that will be a good basis for making quality financial decisions. Namely, its goal is the long-term management of the financial structure of the enterprise in the field of tourism. This type of planning also analyses the feasibility of using certain sources of funding in order to make sound financial decisions that enable value creation and increase investment while preserving financial stability.

There are differences regarding the importance of the planning function in financial decision-making in tourism enterprises. The planning function is important in making quality financial decisions regardless of the size of the enterprise, its organizational structure, and the type of activity. The respondents' views on the question of whether planning inputs are taken into account in financial decision-making by management in the firms where they have based their employment relationship are given in Table 1.

Table 1. Does your company take into account the inputs of planning into management's financial decision-making?

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| | Considered | Partly taken into account | Not taken into account | Total |
|---|---|---|---|---|
| Number of respondents | 13 | 171 | 16 | 200 |
| Participation in % | 6,50% | 85,50% | 8,00% | 100% |

From the data in Table 1, which presents the respondents' views on whether planning inputs are taken into account in financial decision-making by management, it can be stated that for the most part in the analyzed tourism enterprises, planning inputs are partially taken into account in financial decision-making by management, While it is almost negligible the number of respondents who said that they do not take into account the output of planning at all In financial decision-making, management takes into account the inputs of planning into management's financial decision-making. This situation points to the fact that financial decision-making in tourism sector enterprises, for the most part, does not take the inputs of planning as the primary function of management in tourism enterprises. That is, the mere fact that planning inputs are partially taken into account in financial decision-making by management, they are not qualitative, because financial management at any given time does not have insight into the inflows and outflows of financial assets, whether larger or smaller inflows are expected compared to the previous period, the amount of cash available, but there is a need for additional funding, How long and under what conditions will borrowed funds be needed, and the like. Hence, it follows that decisions related to finance, without proper application of planning inputs, in the analyzed tourism enterprises, financial decisions are not entirely relevant and do not fully contribute to the future growth and development of enterprises. The consistent application of planning inputs to financial decision-making in tourism enterprises would undoubtedly contribute to effective and efficient operations.

It is generally stated that the inputs from planning in financial decision-making by the management in the operation of enterprises in the field of tourism sector in the Republic of Macedonia are partially taken into account, regardless of the activity they perform.

In order to overcome these conditions, which are present in the tourism sector of the Republic of North Macedonia, it is necessary to take into account the inputs from planning in financial decision-making by the management in the operation of enterprises in the field of tourism.

## Conclusion

The planning function of tourism enterprises in the Republic of Macedonia is one of the key steps in making a profit. This feature traces the path to the desired goals of the tourism enterprise in a specified period of time. The goal of the financial planning function is to deliver quality outputs that will be a good basis for making quality financial decisions. Namely, its goal is the long-term management of the financial structure of the enterprise in the field of tourism. This type of planning also analyses the feasibility of using certain sources of funding in order to make sound financial decisions that enable value creation and increase investment while preserving financial stability.

It is generally stated that the inputs from planning in financial decision-making by the management in the operation of enterprises in the field of tourism sector in the Republic of Macedonia are partially taken into account, regardless of the activity they perform. In the face of fierce competition, challenges, legal regulations, changes, a tourism enterprise needs to

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have a good strategy on how to survive. That's exactly what the planning function offers with its outlets for making quality financial decisions. When the financial manager does not have a plan in front of him, which does not have to be in writing, then each subsequent financial decision he makes may defocus and distract him from those financial activities that would mean greater success and growth of the tourism enterprise.

**In order to overcome these conditions, which are present in the tourism sector of the Republic of North Macedonia, it is necessary to take into account the inputs from planning in financial decision-making by the management in the operation of enterprises in the field of tourism. Because planning means implementing techniques and methods that provide a simpler and more practical mechanism for successfully executing plans in real time.**

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