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THE TRADEMARK APPLICATION ACTIVITY IN BULGARIA ACCORDING TO THE NICE CLASSIFICATION AND ECONOMIC SECTORS FOR THE PERIOD 2010-2020[2]

This study presents the state and dynamics of Bulgarian and foreign trademark activity in Bulgaria as measured by the NICE classes of the trademark applications for the period 2010-2020. The aim of the development is to study the interaction between the Bulgarian and foreign trademark applicant activity in Bulgaria for the period 2010-2020 to identify the priority classes under the Nice Classification and the priority economic sectors, i.e. those with the greatest potential for economic development. The analyses of trademark activity presented in the study show how by using the trademark statistics and by applying the System of Concordance developed for the purposes of this study, priority and most promising economic sectors can be identified, which brings out trademark activity as a valuable and unique information resource. The proposed research can be used for information support of management decisions and to make trademark and brand management strategies more effective.
Keywords: trademark; applicant activity; Nice classification; ISIC; NACE
JEL: O30; O34; O50

1. Introduction

In the context of globalisation, trademarks play an essential role in imposing products in the consumer consciousness and in shaping the competitiveness of enterprises. The importance of trademarks is growing at a sustainable pace, which can be judged by the World Intellectual Property Organization's annual reports. The data show that in 2020 applications for trademarks increased by 16.5% compared to 2019, their number reaching a total of 13.4 million worldwide (WIPO, 2021). This expresses the continuous development of the role of trademarks for business prosperity (Götsch, Hipp, 2012; Millot, 2012; Flikkema, Castaldi, De Man, Seip, 2015; Castaldi, Dosso, 2018; Castaldi, Block, Flikkema, 2020), but it is far from sufficient to reveal the direction of this development, and in particular the economic importance of trademarks.

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This development is motivated by the need to take into account the relationship between trademarks and the economic activity of enterprises. In it, we reveal not only the importance of trademarks applicant activity for the development of the economy, but also, through the applied research methods and approaches, we are looking for an answer to the question: Is there a link between the intensity of the trademarks applicant activity and the development of the economic sectors in Bulgaria?

The **object** of this study is the legal protection of trademarks.

The **subject** of the study is the trademark applicant activity in Bulgaria over the period 2010-2020 and its relationship with the economic sectors and economic activities.

The **purpose** of this study is: to investigate the state and structure of trademark activity in Bulgaria within the period 2010-2020 as measured by the number of classes specified in the applications for registration of trademarks and to establish the priority economic sectors and economic activities in Bulgaria. The study period (2010-2020) allows monitoring of the ongoing changes in the structure of the trademark activity for an extended period of time and provides an opportunity to reveal the existing links and interdependencies between the Bulgarian and foreign trademark applicant activity in Bulgaria. The results of this study can be used to provide information for management decisions, to develop comprehensive business strategies and to increase efficiency in building trademark and brand management strategies, as well as to track the development of economic sectors in Bulgaria in the context of Bulgarian and foreign trademark activity.

With regards to the above, the formulated objective is achieved through the following tasks:

1. Analysis of the existing literature in the field of trademarks and presentation of International Classification of Goods and Services for Registration of Trademarks (Nice Classification), International Standard Industrial Classification of All Economic Activities (ISIC), Statistical Classification of Economic Activities for the European Community (NACE Rev.2), Classification of Economic Activities in Bulgaria (NACE.BG 2008).
2. Derivation of a System of Concordance between the Nice Classification and the International Standard Industrial Classification of All Economic Activities. The necessity of that system is dictated by the fact that, when filing and registering a trademark, a list of classes of goods and services for which the trademark will be used is indicated. They correspond indirectly to the economic activity of enterprises, so it is necessary to establish a methodology for assigning the Nice classes to a specific economic sector or economic activity according to the ISIC.
3. Establishment of trademark applicant activity in the period 2010-2020 by class for each year and in total for the study period. On the basis of the data obtained and by applying comparative analyses, the classes in which Bulgarian and foreign applicants have the greatest interest in the study period stand out.
4. Comparison of the intensity of the trademark activity of Bulgarian and foreign applicants and identification of the priority economic sectors and activities in which the concentration of Bulgarian and foreign trademark applicant activity is the highest. This is

achieved by taking into account the number of filed trademark applications for each Nice class, after which the total number of applications is redirected to a specific economic sector by applying the System of Concordance between the Nice classes and the ISIC.

5. Summarising of the results and formulation of the main conclusions.

The **working hypothesis** is: There is a high degree of coincidence between the concentration of the classes of trademark activity by Bulgarian and foreign applicants by economic sectors and economic activities, i.e. foreign applicant activity is directed to economic sectors and activities in which Bulgarian applicant activity is higher.

The **limitations** in the present study are:

- The study period is limited to 2020 due to the specifics of data collection and processing by the World Intellectual Property Organization (WIPO) and the lack of data for 2021. This prevents the impact of the resulting COVID-19 economic crisis on trademark activity and the development of economic sectors but provides an opportunity for future developments.
- The trademark activity covers the applications of Bulgarian citizens in Bulgaria and foreign citizens in Bulgaria. The trademark activity of Bulgarian citizens abroad remains beyond the scope of the study.
- When applying the System of Concordance between the Nice Classification and the ISIC, the trademark applications by foreign applicants in Bulgaria, not applying the Nice System, remain outside the scope of the study.

This study and the presented System for Concordance of classes of the International Classification of Goods and Services with the economic sectors will enrich the research in the field of industrial property objects and will outline their role in business development. The relevance of the study is to consider the role of trademarks as an indicator of the development of economic sectors and a factor for the sustainable economic development of companies.

2. Literature Review

In order to determine the role of trademarks in the development of modern business, it is necessary to first examine their nature in depth.

2.1. The trademark as industrial property

The definitive features of the trademark as an industrial property are revealed in the first place by legislative acts. At a national level, a key document regulating the rights and obligations of the trademark owners, as well as the terms and procedures for the application and registration of trademarks, is the Trademarks and Geographical Indications Act (ZMGO). Pursuant to Article 9(1) of the Basic Regulation, adopted on 27.10.2020, "*A trademark is a sign, capable of distinguishing the goods or services of one person from those of others and*

may be presented in the State Register of Trademarks in such a way, that it is possible to clearly and accurately determine the subject of the protection, granted by the registration. Such signs may include, for example: words, including the names of persons, letters, numbers, drawings, figures, the shape of the goods or their packaging, colours, sounds or any combination of such signs." (ZMGO, 2020).

Other definitions of a trade mark are found in regional and international directives and treaties. According to DIRECTIVE (EU) 2015/2436 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL: *"A trade mark may consist of any signs, in particular words, including personal names, or designs, letters, numerals, colours, the shape of goods or of the packaging of goods, or sounds, provided that such signs are capable of: (a) distinguishing the goods or services of one undertaking from those of other undertakings; and (b) being represented on the register in a manner which enables the competent authorities and the public to determine that clear and precise subject matter of the protection afforded to its proprietor."* (Chapter 2, Section 1, Art. 3)

The Agreement on Trade-Related Aspects of Intellectual Property (TRIP's) states that the trademark is *"Any sign, or any combination of signs, capable of distinguishing the goods or services of one undertaking from those of other undertakings, shall be capable of constituting a trademark. Such signs, in particular words including personal names, letters, numerals, figurative elements and combinations of colours, as well as any combination of such signs, shall be eligible for registration as trademarks. Where signs are not inherently capable of distinguishing the relevant goods or services, Members may make registrability depend on distinctiveness acquired through use. Members may require, as a condition of registration, that signs be visually perceptible"* (TRIP's Agreement, Section 2, Art. 15, 1).

The trademark is also a subject of in-depth analysis by the researchers. According to Marco & Myers (2015), there are three different but interconnected perspectives in the economic analysis of trademarks. First, in basic economic theory, the trademark is seen as a means of promoting market efficiency. In more recent literature, the trademark is not seen only as a source for identifying the undertaking, it has a number of other functions. For example, according to Beebe (2004), trademarks are a valuable intangible asset that can be used as a barrier to competitors looking to enter the same market niche. Considering the importance of the trademark as an intangible asset and in the context of the COVID-19 pandemic, we must point out that over the last 25 years, the value of intangible assets owned by companies has increased by more than 1000% (Brand Finance, GIFT 2021) and even during the economic crisis due to the COVID-19, the value of intangible assets continues to increase. This proves the economic importance of trademarks for companies as they are a crisis-resistant asset that, through effective management, can increase the competitiveness of enterprises and, on this basis, increase economic benefits.

The second perspective sees trademarks as the basis for developing the value of the brand (Nikolova-Minkova, 2021a). From a marketing point of view, two concepts are known: the former is tied to consumer-based brand equity (Aaker, 1996; Keller, 2013; Ahirao, Patil, 2017), and the second concept – financial, considers the brand equity as a result of efforts to create a positive image among consumers and the impact of this image on the value of the brand to shareholders (Kerin and Sethuraman, 1998). Accepting the importance of the

financial concept, however, we will point out that the social significance of trademarks and brands is revealed precisely through the concept of Customer-Based Brand Equity (CBBE). Well-established brands based on registered trademarks have a social responsibility to society as a whole and to their customers, which was particularly evident during the COVID-19 pandemic. A number of studies in this period reveal the relationship between the value of companies' brands and the sustainability of their results amid the deepening economic crisis (Knowles, Ettenson, Lynch, Dollens, 2020; Alexa, Apetrei, Sapena, 2021; Verlegh, Bernritter, Gruber, Schartman, Sotgiu, 2021; Nikolova-Minkova, 2021b, 2021c). Moreover, COVID-19 commits companies to promote socially significant causes and to impose and demand responsible consumer behaviour to reduce the spread of the virus and limit the serious consequences in society. Consumers, in turn, expected a reaction from the brands and switched to those who clearly stated their socially responsible position.

The third perspective focuses on the relationship between trademarks and innovation or company performance (Fink, Javorcik, Spatareanu, 2005; Helmers, Rogers, 2008; Davies, Davies, 2011). This is also the direction that has developed at a rapid pace in recent decades. According to research by Schautschick & Greenhalgh (2012), trademarks in combination with other forms of intellectual property, are a useful indicator of innovative activity. Castaldi & Dosso (2018) are also exploring the relationship between trademark activity and companies' R&D costs. Empirical literature reveals a link between trademark activity and innovation in knowledge-intensive business services – KIBS (Schmoch, 2003; Hipp, Grupp, 2005). The review of research focusing on the relationship between trademarks and innovation, or corporate performance, proves the need to use trademark activity as a complementary and in some cases even as a key indicator of innovation activity. In recent years, under the influence of COVID-19 and in parallel with the development of the knowledge economy, the share of innovation in intangible products in the field of technological knowledge, education, administrative and organisational processes, whose legal protection cannot be provided by patenting, but on the other hand, it can be done through the registration of a trademark, has increased. This determines the use of trademark activity as an appropriate indicator for measuring non-technological innovation at the company, sectorial or national level.

All of the above determines the need for trademark management as an asset for the company and an object of intellectual property (in particular – of industrial property). As Borisova (2018) points out, the management of intellectual property for the purposes of companies is expressed in the management of the objects themselves and the management of the rights over them. The management of the rights on the objects of intellectual property is carried out by exercising the powers in the composition of the exclusive right, as the main goal is the economic realisation of the objects of intellectual property (trademarks) through their use.

Intellectual property management makes intellectual property a strategic asset for companies. Trademarks are subject to the intellectual property of economic importance, especially as mentioned above, due to the rapid development in recent years of non-technological innovations that remain beyond the scope of patenting. Market-established and well-established trademarks are becoming a competitive advantage and generating additional profits for companies, as consumers tend to pay more for a branded product than for a similar "non-branded" product. Trademarks/brands can attract additional cash flow through their

licensing (franchising), can be used in advertising campaigns and branding strategies to build a positive image of companies by linking the brand image with socially significant causes for society, etc.

The above stated justifies the growing economic importance of trademarks for modern companies. Despite the wide range of these areas of research interest in trademarks, not all interdependencies have been explored and not all links have been revealed. One of the areas where there are still gaps and insufficient research has been carried out is the link between the intensity of trademark activity and the development of economic sectors. In order to reveal this link, it is necessary to pay attention to the Nice Classification of Goods and Services for the registration of trademarks and the relationship of that classification with economic activities.

2.2. International Classification of Goods and Services for Trademark Registration (Nice Classification)

In order to establish the specialisation of trademarks and their individualisation in relation to the goods and services for which the trademark is applied, the International Classification of Goods and Services for Registration of Trademarks, adopted after the signing of the Nice Agreement in 1957, is used. Bulgaria has been a member of the Agreement since 12.07.2000. The Nice Classification (see Table 1) was introduced to harmonise national classifications in the field of trademarks and geographical indications and after the last revision on 1 January 2022, it contains a list of 45 classes: 01 to 34 for goods and 35 to 45 for services (WIPO, NCL 11-2022).

The structure of the Classification is divided into three parts:

- Class Headings – the list of classes briefly describes their content;
- Explanatory Notes – describe in detail which goods and services fall within or remain outside the scope of the relevant class;
- Alphabetical List – the most detailed describes each good and service that can be assigned to the relevant class.

The Classification also contains general notes explaining how the classification of the goods or services concerned are classified to a particular class and the principles to be followed by applicants in determining the scope of the trademark applied for.

The Nice Classification is subject to periodic revision by a special committee to keep it up-to-date with regard to innovative goods and services offered on the market. In view of the above, Marco & Myers (2015) point out that research using the Nice Classification should be conducted with caution due to: the periodic revision of the Nice Classification, which involves supplementing/replacing/dropping certain goods and services from classes; the ability of a specific class to reflect the channel through which goods and services are delivered and offered to consumers, rather than the primary activity of the trademark owner; aggregated into large classes goods and services are obtained through activities of different nature.

Table 1

Nice classes: General structure

Class	Goods	Class	Services
1	Chemicals	35	Business Services
2	Paints	36	Financial and Insurance Services
3	Detergents	37	Construction
4	Industrial Oils and Greasers	38	Telecommunications
5	Pharmaceuticals	39	Transportation and Travel
6	Metals	40	Treatment of Materials
7	Machinery	41	Education
8	Hands Tools and Implements	42	Scientific and Technological Services
9	Scientific Equipment	43	Food Services
10	Surgical Equipment	44	Medical Services
11	Illumination	45	Legal services
12	Vehicles		
13	Firearms		
14	Precious Metals		
15	Musical Instruments		
16	Paper Products		
17	Rubber		
18	Leather		
19	Constructions		
20	Furniture		
21	Household Utensils		
22	Ropes and String		
23	Yarns and Threads		
24	Textiles		
25	Clothing		
26	Dressmaking Supplies		
27	Rugs		
28	Toys		
29	Meat, Fruit, Oil, and Other		
30	Coffee, Sugar, and Other		
31	Agriculture		
32	Non-Alcoholic Beverages		
33	Alcoholic Beverages		
34	Tobacco		

Source: INTA, 2017.

Taking into account the above (Marco, Myers, 2015), we seek to develop a methodology for concordance between the Nice Classification and the Classification of Economic Activities, which will limit the manifestation of these considerations by combining different economic activities in a way that compares them with the aggregated classes of goods and services according to the Nice Classification. Thus, the change in the composition of the classes of goods and services (by dropping or supplementing goods and services in a separate class) should not affect the proposed methodology, as the Nice Classification classes themselves include meaningfully related to a certain attribute goods/services.

2.3. Classification of Economic Activities – International Standard Industrial Classification of All Economic Activities (ISIC), Statistical classification of economic activities in the European Community (NACE Rev.2) and Classification of economic activities in Bulgaria (NACE.BG 2008)

According to the United Nations publication, *"The International Standard Industrial Classification of All Economic Activities (ISIC) is the international reference classification of productive activities. Its main purpose is to provide a set of activity categories that can be utilised for the collection and reporting of statistics according to such activities"* (United Nations Publication, ISIC, Rev.4, 2008).

The first version of ISIC was established in 1948, which is why a large number of countries worldwide use the classification as national, or develop one on the basis of ISIC. This allows the classification to be used as a tool for comparing statistics on economic activities at an international level.

ISIC is also subject to periodic updating, with four revisions so far (United Nations). The latest version is structurally more detailed and meets the need to identify new industries, especially in the services sector.

Table 2

High-level ISIC Rev.4/ NACE Rev.2 aggregation A*10/11

	ISIC Rev. 4/ NACE Rev. 2 sections	Description
1	A	Agriculture, forestry and fishing
2	B, C, D and E	Manufacturing, mining and quarrying and other industry
2a	*C*	*Of which: manufacturing*
3	F	Construction
4	G, H and I	Wholesale and retail trade, transportation and storage, accommodation and food service activities
5	J	Information and communication
6	K	Financial and insurance activities
7	L	Real estate activities*
8	M and N	Professional, scientific, technical, administration and support service activities
9	O, P and Q	Public administration, defence, education, human health and social work activities
10	R, S, T and U	Other services
* which includes imputed rents of owner-occupied dwellings		

Source: Eurostat (2008).

Table 3

Intermediate ISIC Rev.4/ NACE Rev.2 aggregation A*38

	A*38 code	ISIC Rev. 4/ NACE Rev. 2 sections	Division
1	A	Agriculture, forestry and fishing	01 to 03
2	B	Mining and quarrying	05 to 09
3	CA	Manufacture of food products, beverages and tobacco products	10 to 12
4	CB	Manufacture of textiles, apparel, leather and related products	13 to 15
5	CC	Manufacture of wood and paper products, and printing	16 to 18
6	CD	Manufacture of coke, and refined petroleum products	19
7	CE	Manufacture of chemicals and chemical products	20
8	CF	Manufacture of pharmaceuticals, medicinal chemical and botanical products	21
9	CG	Manufacture of rubber and plastics products, and other non-metallic mineral products	22+23
10	CH	Manufacture of basic metals and fabricated metal products, except machinery and equipment	24+25
11	CI	Manufacture of computer, electronic and optical products	26
12	CJ	Manufacture of electrical equipment	27
13	CK	Manufacture of machinery and equipment n.e.c	28
14	CL	Manufacture of transport equipment	29+30
15	CM	Other manufacturing, and repair and installation of machinery and equipment	31 to 33
16	D	Electricity, gas, steam and air-conditioning supply	35
17	E	Water supply, sewerage, waste management and remediation	36 to 39
18	F	Construction	41 to 43
19	G	Wholesale and retail trade, repair of motor vehicles and motorcycles	45 to 47
20	H	Transportation and storage	49 to 53
21	I	Accommodation and food service activities	55+56
22	JA	Publishing, audiovisual and broadcasting activities	58 to 60
23	JB	Telecommunications	61
24	JC	IT and other information services	62+63
25	K	Financial and insurance activities	64 to 66
26	L	Real estate activities*	68
27	MA	Legal, accounting, management, architecture, engineering, technical testing and analysis activities	69 to 71
28	MB	Scientific research and development	72
29	MC	Other professional, scientific and technical activities	73 to 75
30	N	Administrative and support service activities	77 to 82
31	O	Public administration and defence, compulsory social security	84
32	P	Education	85
33	QA	Human health services	86
34	QB	Residential care and social work activities	87+88
35	R	Arts, entertainment and recreation	90 to 93
36	S	Other services	94 to 96
37	T**	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	97 +98
38	U**	Activities of extra-territorial organisations and bodies	99*

* including imputed rents of owner-occupied dwellings
** All of U and part of T (division 98) are outside the SNA production boundary, and will be empty for SNA data reporting, but are included for completeness.

Source: Eurostat (2008).

The Statistical Classification of Economic Activities for the European Community (NACE Rev.2) is based on ISIC Rev. 4. *„NACE Rev. 2 has been created based on ISIC Rev. 4 and adapted to the European circumstances by a working group of experts on statistical classifications from the Member States, candidate Countries as well as EFTA Countries, with the support and guidance of the classification section at Eurostat"* (Eurostat, 2008). In addition to the classification developed *„introductory guidelines containing the main concepts, a historical background and the methodological guidelines for understanding and applying NACE Rev.2 as well as a detailed description of the different items of the classification"* are proposed. NACE Rev.2 is generally a classification standard on the basis of which national classifications of the Member States of the European Union are developed, updated and applied. According to the Regulation, statistics on EU countries are classified by economic activity and collected by NACE or by the corresponding derivative national classification. The Statistical classification of Economic Activities for the European Community is also revised over a given period in order to correspond to the technological developments and structural changes in the economy.

NACE Rev.2 presents the relationship between the two classifications at the highest level (see Table 2) and at an intermediate level (see Table 3).

Based on the Statistical Classification of Economic Activities for the European Community, a Classification of Economic Activities was also developed – version NACE.BG 2008. NACE.BG 2008 ensures the direct application of NACE Rev. 2 in the Republic of Bulgaria, as it is unambiguously compatible with the International Standard Industrial Classification of the United Nations (ISIC, Rev. 4), which, as we have pointed out, is the basis for the establishment of NACE Rev. 2.

The above shows unequivocally that the harmonisation of classifications at global, European and national levels ensures comparability of the statistics obtained at each of those levels. On the other hand, as Luini & Mangani point out, *„Unfortunately the Nice Classification of products and services adopted by all Trademark Offices does not correspond to the standard classification of economic activities used by Statistics Offices for analysing the main economic aggregates"* (2004, p.5).

Nevertheless, like other researchers, we are trying to establish concordance between the classes of goods and services and the economic sectors and activities, the presentation of which requires first to consider the existing empirical studies in this regard.

3. Method

The need to develop a System for concordance between the classes of goods and services according to the Nice Classification and the Classification of Economic Activities and Sectors arises from:

- the growing importance of trademarks as a business asset and their wide use for the protection of non-technological innovations, creating a need to study the relationship between trademark activity and the economic activity of companies;

- the wide availability of data on the trademark activity of companies and at the same time, difficult assignment of this activity to a specific economic sector to establish innovation activity at the company, industry and national level;
- the monitoring the development of companies on the basis of intellectual property management strategies and, in particular, for building competitiveness and differentiation of the products offered on the basis of established brands;
- the study of the links and dependencies between the owned intellectual property rights (trademarks) and the resilience of companies to unpredictable economic shocks and crises;
- the establishing a link between the product specialisation of the companies and the export specialisation of the country in which they operate.

In order to derive a methodology applicable to the Bulgarian practice, through which the issues of interest to the scientific community can be analysed, we will consider the currently known studies examining the relationship between classes of goods and services in the scope of trademark protection and international classifications of economic activities.

3.1. Existing research comparing the Nice Classification and the economic sectors and activities

As we have pointed out, the relationship between the classes of goods and services within the scope of trademark protection and international classifications of economic activities is the subject of analysis by a number of researchers and organisations. For the purposes of this study, we will consider as a matter of priority those of Luini & Mangani (2004), Fink, Javorcik & Spatareanu (2005), Millot (2009), Zolas, Lybbert and Bhattacharyya (2016), WIPO, while not belittling the research of other authors. This is based on the fact that, when analysing empirical research in the field, the systems cited above are most often used for assigning trademark activity and its scope to the classification of economic activities.

In their study, Luini & Mangani (2004) examined the relationship between trademarks and the economic activity of companies in Italy. They compare the distribution of product classes by national, regional (EU) and international trademarks registered by Italian companies. For their study, the authors sought consistency between the classes of goods and services of the Nice Classification and the Classification of Economic Activities in Italy – ATECO 2002. By comparing the specialisation of trademarks and the country's export specialisation, the authors found that „*Data on Italian trademarks would seem to show that trademark applications and registrations "follow" quite closely the structure of the economy and its evolution. There may thus be a positive relationship between the "size" of economic activity, at different levels of aggregation, and product differentiation, when the latter is estimated by the use of trademarks."* (Luini, Mangani, 2004, p. 15). By comparing the country's trademark specialisation and export specialisation, the authors found that European data have shown that trademark specialisation significantly reflects countries' export flows, although some exceptions have also been taken into account.

The cited study is one of the first in this field and sets starting points that we can follow in creating a system suitable for the purposes of this study.

Fink, Javorcik & Spatareanu (2005) studied the application of Linder's hypothesis (Rauch, 2010), to which they added a new determinant of the proximity between supply and demand, namely the degree of horizontal differentiation of the product. To verify their hypothesis, the authors set up a system to align the Nice Classification with the ISIC (see Table 4).

Table 4

Concordance between Nice Classification and ISIC Classification

Nice classification	ISIC	ISIC classification
1	351	Industrial chemicals
2,3,5	352	Other chemicals
4	354	Miscellaneous petroleum and coal products
6	371	Iron and Steel
7	382	Machinery, except electrical
8	381	Fabricated metal products
9, 10	385	Professional and scientific equipment
11	383	Machinery, electric
12	384	Transport equipment
13, 15, 28	390	Other manufactured products
14	372	Non-ferrous metals
16	341, 342, 356	Paper and products & Printing and publishing &Plastic products
17	355	Rubber products
18	323	Leather products
19	369	Other non-metallic mineral products
20	332	Furniture, except metal
21	361, 362	Pottery, china, earthenware & Glass and products
22, 23, 24, 26, 27	321	Textiles
25	322, 324	Wearing apparel, except footwear & Footwear, except rubber or plastic
29, 30, 31	311	Food products
32, 33	313	Beverages
34	314	Tobacco

Source: Fink, Javorcik & Spatareanu (2005, p.23).

The empirical analysis uses information on the registration of international trademarks to verify the extent to which richer countries tend to import more from countries whose exports are of higher quality and show a greater degree of product differentiation. The results are confirmed for most consumer goods sectors, but not in the intermediate goods sectors.

We think that the system proposed by Fink, Javorcik & Spatareanu (2005) for aligning the classes of goods under the Nice Classification to ISIC is extremely detailed, but its practical use for the purposes of this empirical analysis is not applicable. This is because the National Statistical Institute (NSI), which processes data on the development of economic activities in Bulgaria, provides information about them at the highest level of data grouping (*aggregation A*10/11; aggregation A*38*).

Then, in his study for OECD, Millot (2009) sought a potential link between trademarks and innovation by looking at their basic statistical properties to establish their relevance as an indicator of innovation. He also points out the shortcomings of the Nice Classification in linking it to economic sectors and statistical analysis activities. He notes: *„Moreover, the trademark classification has been built with a focus on the demand, the customers' side,*

whereas the Sector classifications focus on the firms' side, on the supply" and more *„On the whole, it is generally difficult to associate an industrial sector to a specific trademark class, as some sectors register in various classes and conversely some trademarks are associated to various sectors."* (Millot, 2009, p. 26). However, the author points out that for some classes, a direct link to a specific sector may be established (see Table 5).

Table 5

Clear correspondence for sectors and classes

NACE sector	Nice classes
17, 18 and 19: textile, wearing, leather products	24-25
20: wood and cork products	20
21, 22: paper products, printing and publishing	16
25: rubber and plastic products	17
27: basic metal products	6
30, 31, 32, 33: electrical and optical equipment	9
34, 35: transport equipment	12
60, 63: transport and storage	39
67: financial intermediation	36
72, 73: computer-related activity, research and development	42

Source: Millot, (2009, p. 26).

The presented partial system of alignment does not cover all the Nice classes, which requires us to deepen the analysis of existing empirical studies in search of an adequate approach to aligning the classes between the cited classifications.

Zolas, Lybbert and Bhattacharyya (2016) derive the „Algorithmic Links with Probabilities – ALP" approach, which allows the researcher to relate the data on the scope of trademark activity directly to a particular sector. This creates conditions for tracking in time the dynamics and structure of changes in trademark activity as well as to conducting comparative analyses of trademark activity in individual countries (see Table 6).

Table 6

Concordance between Nice classes and economic categories

Economic categories	**Nice classes**
Chemicals	1, 2, 3, 4, 5
Metals & machinery	6 to 8, 12, 14
High-tech	9, 38, 42
Textiles	22 to 26
Food & beverages	27 to 34
Other manufacturing	10, 11, 15 to 21, 27, 28
Other services	35 to 37, 39 to 41, 43 to 45

Source: Zolas, Lybbert and Bhattacharyya (2016, p.15).

This system for concordance between the classes of goods and services to the economic categories is one of the most commonly applied in the research in the field (Grazzi, Piccardo, Vergari, 2017; Drivas, 2021; Iversen, Herstad, 2021), so we will adapt it for the purposes of this study taking into account the peculiarities of the other systems cited.

Finally, the annual reports of WIPO (World Intellectual Property Indicators, 2021) apply a methodology for concordance of Nice classes with the economic sectors in order to take into account the structure of trademark activity and dynamics in its development (see Table 7).

Table 7

Concordance between Nice classes and industry sector

Economic categories	Nice classes
Research and technology	9, 38, 42, 45
Health	3, 5, 10, 44
Clothing and accessories	14, 18, 22 to 27, 34
Agriculture	29 to 33, 43
Leisure and education	13, 15, 16, 28, 41
Household equipment	8, 11, 20, 21
Business services	35 and 36
Transportation	7, 12, 39
Construction	6, 17, 19, 37, 40
Chemicals	1, 2, 4

Source: WIPO (2021, p.103).

Of course, in addition to the cited, there are other studies, that offer systems for assigning the Nice classes to the International Classification of Economic Activities, which focus on individual sectors or activities (Máté, Kun & Fenyves, 2016; Kekezi, & Klaesson, 2020; Iversen & Herstad, 2021) and which imply the existence of a link between trademark activity and, in particular, the scope of the trademark protection (classes of goods and services) and the development of economic sectors and activities. The existing empirical studies not only confirm this link but propose to deepen and expand the scope of research in this direction in order to establish the economic importance of the data obtained.

All the above gives us the reason to try to derivate a System of concordance between the Nice classes and the ISIC/NACE classifications. The prerequisites for adapting the existing methodologies of the cited research arise from:

- the lack of a System for assigning the classes of goods and services according to the Nice Classification to the Classification of Economic Activities, which is applicable in Bulgaria and is consistent with the specifics of data submission of the NSI;
- the need to combine the elements of the systems proposed above for the Bulgarian practice and to eliminate the inapplicable ones, due to the specifics of presenting statistical data in the Republic of Bulgaria;
- the lack of empirical analysis of the relationship between trademark activity and economic sectors in Bulgaria, based on which to assess the development of the country.

3.2. New System for concordance between Nice classes and ISIC/NACE divisions

The developed System assumes that when initially assigning classes of goods and services to a specific economic activity, they are disaggregated to the level of reporting of statistical data by the NSI (see Table 8). These sectors and sections of ISIC Rev.4 / NACE Rev. 2 / NACE.BG 2008 are included, which are related to trademark registration classes.

Table 8

Concordance between Nice classes and ISIC/ NACE division

Economic sector	Name of the division	ISIC/ NACE division	Nice classes
C. Manufacturing	Manufacture of food products	10	27, 29, 30, 31, 32, 33, 34
	Manufacture of beverages	11	
	Manufacture of tobacco products	12	
	Manufacture of textiles	13	18, 22, 23, 24, 25, 26
	Manufacture of wearing apparel	14	
	Manufacture of leather and related products	15	
	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	16	16
	Manufacture of paper and paper products	17	
	Printing and reproduction of recorded media	18	
	Manufacture of chemicals and chemical products	20	01, 02, 03, 04
	Manufacture of basic pharmaceutical products and pharmaceutical preparations	21	05
	Manufacture of rubber and plastic products	22	17, 21
	Manufacture of other non-metallic mineral products	23	
	Manufacture of basic metals	24	06, 08, 13
	Manufacture of fabricated metal products, except machinery and equipment	25	
	Manufacture of computer, electronic and optical products	26	09, 38, 42
	Manufacture of electrical equipment	27	11
	Manufacture of machinery and equipment n.e.c.	28	07
	Manufacture of motor vehicles, trailers and semi-trailers	29	12
	Manufacture of other transport equipment	30	
	Manufacture of furniture	31	10, 14, 15, 20, 28
	Other manufacturing	32	
	Repair and installation of machinery and equipment	33	
F. Construction	Construction of buildings	41	19, 37, 40
	Civil engineering	42	
	Specialised construction activities	43	
G. Wholesale and retail trade; repair of motor vehicles and motorcycles	Wholesale and retail trade and repair of motor vehicles and motorcycles	45	35
	Wholesale trade, except of motor vehicles and motorcycles	46	
	Retail trade, except of motor vehicles and motorcycles	47	
H. Transportation and storage	Land transport and transport via pipelines	49	39
	Water transport	50	
	Air transport	51	
	Warehousing and support activities for transportation	52	
	Postal and courier activities	53	
I. Accommodation and food service activities	Accommodation	55	43
	Food and beverage service activities	56	
K. Financial and insurance activities	Financial service activities, except insurance and pension funding	64	36
	Insurance, reinsurance and pension funding, except compulsory social security	65	
	Activities auxiliary to financial services and insurance activities	66	
L. Real estate activities	Real estate activities	68	
M. Professional, scientific and technical activities	Legal and accounting activities	69	41, 44, 45
	Activities of head offices; management consultancy activities	70	
	Architectural and engineering activities; technical testing and analysis	71	
	Scientific research and development	72	
	Advertising and market research	73	
	Other professional, scientific and technical activities	74	
	Veterinary activities	75	

Source: Authors' elaboration from various sources.

Subsequently, in order to facilitate the processing of trademark activity information, economic sections are aggregated in separate categories (see Table 9). As stated in NACE.BG

2008, the concept of "economic activity" is a category in which relatively homogeneous and similar productions and services are grouped under certain criteria. Under these circumstances and due to the fact that the classes of goods and services according to the Nice Classification are also consolidated, we apply cross-grouping with which we combine sections of different sectors. The aim is not only to establish the sectors in which Bulgarian and foreign trademark applicants exhibit increased interest but also to detect the specific directions (economic categories) in which it is expressed.

It should be borne in mind that, due to the specificity of NSI data submission, some of the economic sections cannot accurately refer to the most appropriate economic categories[3].

The adapted system (see Table 8 and Table 9) for assigning the classes of the goods and services under the Nice Classification to the ISIC/NACE classifications is applicable to take into account the link between the intensity of trademark activity and the development of economic activities in the Republic of Bulgaria. Its degree of disaggregation depends entirely on the specificity of the presentation of statistics and can be modified depending on the direction and objectives of the specific empirical study.

Table 9

Concordance between Nice classes and economic categories

Economic categories	ISIC/ NACE division	Nice classes
Food & beverages	10, 11, 12	27, 29, 30, 31, 32, 33, 34
Clothing and accessories	13, 14, 15	18, 22, 23, 24, 25, 26
Chemicals	20	01, 02, 03, 04
	21	05
High-tech	26	09, 38, 42
Metals, machinery & equipment	24, 25	06, 08, 13
	28	07
Construction	22, 23	17, 21
	41, 42, 43	19, 37, 40
Household equipment & facilities	27	11
	31, 32, 33	10, 14, 15, 20, 28
Other manufacturing	16, 17, 18	16
Transportation	49, 50, 51, 52, 53	39
	29, 30	12
Business services	45, 46, 47	35
	64, 65, 66	36
	68	
Professional, scientific and technical activities	55, 56	43
	69, 70, 71, 72, 73, 74, 75	41, 44, 45

Source: Authors' elaboration from various sources.

For the present analysis, by applying the concordance system, we strive to identify the existence or lack of a link between the intensity of the Bulgarian and foreign trademark

[3] Example: When reporting the output or turnover of industrial enterprises, NSI combines sections 16, 17 and 18 in category "Production of timber, paper, cardboard and articles thereof (excluding furniture); Printing" despite the fact that Category 16 can be attributed to the "Production of furniture, production, n.; Repair and installation of machines and equipment" and categories 17 and 18 to the "Professional Activities and Research" sector.

applications on individual classes of the Nice Classification and the development of economic sectors and activities. The link between the Bulgarian and foreign trademark activity has characteristic and specific features, so the following statistical analysis methods are applied:

- Spearman's rank correlation analysis (Rsp) – suitable for determining the strength of the mutual relationship between the Bulgarian and foreign trademark applications (represented by ranks), as the quantitative expression of the stated trademarks on each of the classes of the Nice Classification can range and to establish not only the presence/absence but also the degree of correlation dependence. The calculations for the mutual relationship are carried out by using the formula (Petrov, Veleva, 2000):

$$Rsp = 1 - \frac{6\,\Sigma {d^2}_i}{n(n^2 - 1)} \quad (1)$$

- Comparison method – gives a real idea of the quantitative dimensions of trademark applications and is appropriate to determine the priorities for Bulgarian and foreign applicants economic sectors and activities.

4. Data and Results

To conduct the empirical analysis, data on the number of classes for which trademarks were applied were used. The scope of the study focuses on two possible ways to apply for trademarks: nationally road through the Bulgarian Patent Office – BPO and international registration through the Madrid system. The information on the number of specified classes when applying for a trademark was obtained using the WIPO database.

4.1. Trademark applicant activity for the period 2010-2020

In order to establish the priority economic activities targeted by trademark applicant activity in Bulgaria, the analysis is structured in the following sequence:

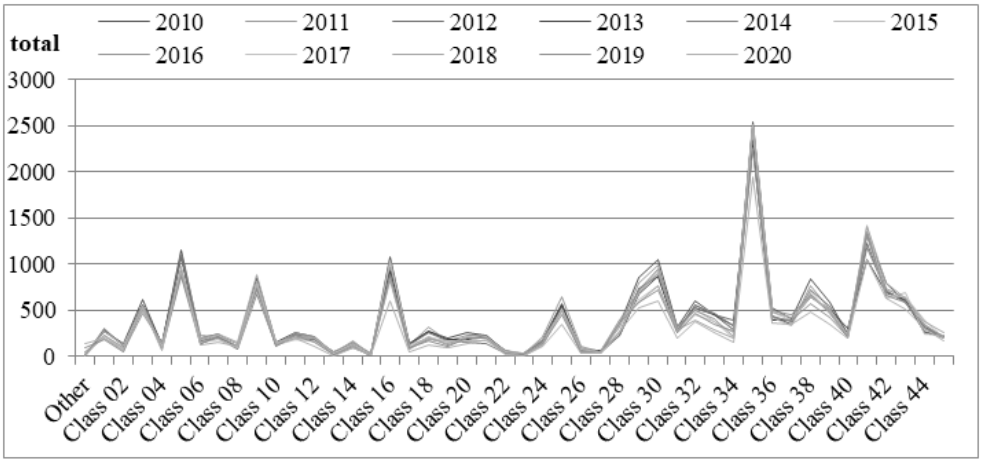
- study of the total trademark applicant activity in Bulgaria (applied trademarks from Bulgarian citizens and foreign citizens);
- study of the Bulgarian trademark activity in Bulgaria;
- study of the foreign trademark activity in Bulgaria.

Information on the Nice Classification classes for which trademarks are applied for each of the years 2010-2020 (see Table 10) is provided. "Other" lists those trademarks applied for in countries which do not apply the Nice Classification of Goods and Services when registering a trademark.

The dynamics of the total trademark application activity (see Figure 1) highlight the classes that applicants are most interested in.

Figure 1

Trademark applicant activity by Nice classes for the period 2010-2020 (Bulgarian and foreign applicants)



Source: WIPO Database / Authors' calculation.

As can be concluded by the dynamics of the total trademark applicant activity in the period 2010-2020, regardless of the existing fluctuations in the number of applications submitted for a specific year, the interest of the applicants is immutably high/low to specific classes in the study period.

Information is also provided on the total number of Nice classes by which trademarks are applied in the scope of the study (see Figure 2).

It should be taken into account that the cited data (see Table 10, Figure 1 and Figure 2) express the total number of classes applied for without applying an equivalent counting[4].

In identifying the Nice classes in which the trademarks applied for have the highest concentration in total for Bulgarian and foreign applicants, the following 10 classes (see Table 11) stand out.

Four of the top ten classes with the highest intensity are in the service sector (28.1% in total), with the highest proportion being class 35 – Business Services, followed by classes: 41 – Education; 42 – Scientific and Technological Services; 43 – Food Services. The ranking is supplemented by six classes related to the production of goods (total 26.96%), with the highest share of which is class 05 – Pharmaceuticals, followed by: 16 – Paper Products; 30 – Coffee, Sugar, and Other; 09 – Scientific Equipment; 29 – Meat, Fruit, Oil, and Other; 03 – Detergents.

[4] In the equivalent counting, in cases where a trademark is applied by more than one applicant, the application is counted as many times as applicants are listed in it.

Table 10

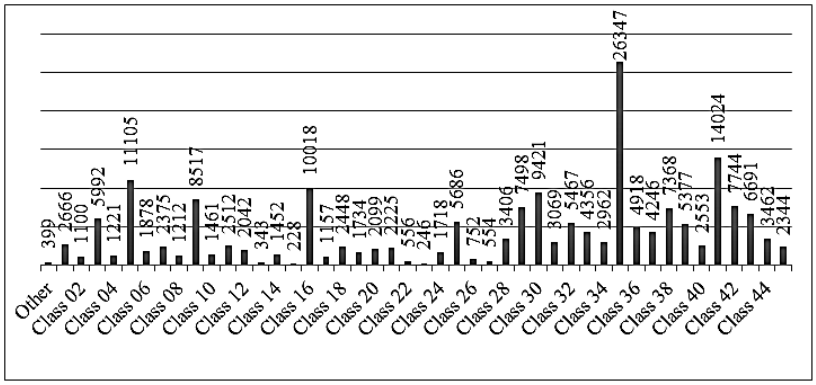
Trademark applicant activity by Nice classes for the period 2010-2020 (Bulgarian and foreign applicants)

Nice class	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Other	14	14	13	7	8	33	50	6	20	95	139
Class 01	278	223	274	283	306	280	193	224	228	179	198
Class 02	139	93	123	129	117	130	70	70	96	54	79
Class 03	617	543	565	558	557	540	476	535	503	549	549
Class 04	121	112	104	139	106	105	142	101	135	87	69
Class 05	1158	1104	1091	1100	1104	949	953	889	896	879	982
Class 06	195	228	166	136	167	162	194	188	181	138	123
Class 07	249	216	223	211	207	184	237	235	239	211	163
Class 08	96	105	98	105	79	99	139	118	155	108	110
Class 09	855	802	748	717	673	702	807	802	887	746	778
Class 10	153	120	138	121	126	121	133	147	138	105	159
Class 11	266	243	245	229	207	189	262	213	231	234	193
Class 12	222	204	180	190	180	173	217	200	206	153	117
Class 13	43	33	41	51	15	24	17	33	48	27	11
Class 14	161	171	134	141	114	132	123	134	151	95	96
Class 15	15	22	32	22	11	23	19	16	34	20	14
Class 16	1084	982	914	927	1052	1032	871	848	820	882	606
Class 17	137	123	127	143	101	123	98	81	88	89	47
Class 18	274	318	260	281	182	206	217	222	196	165	127
Class 19	206	174	177	192	169	166	132	162	146	116	94
Class 20	258	236	184	182	152	165	203	164	213	194	148
Class 21	225	226	224	213	144	171	220	211	200	207	184
Class 22	58	58	51	70	39	50	52	47	71	37	23
Class 23	22	24	38	22	12	21	25	27	34	15	6
Class 24	183	219	165	162	127	119	160	146	185	134	118
Class 25	575	642	549	555	505	506	521	519	498	460	356
Class 26	66	106	82	66	41	51	66	82	98	52	42
Class 27	46	55	64	73	41	37	56	50	53	39	40
Class 28	345	318	256	230	236	261	387	354	389	358	272
Class 29	854	790	732	672	728	699	713	614	581	591	524
Class 30	1050	986	878	877	950	927	904	762	772	716	599
Class 31	318	290	270	282	317	278	320	262	284	255	193
Class 32	598	551	563	535	513	513	504	448	397	471	374
Class 33	451	471	455	449	468	377	402	383	288	354	258
Class 34	296	297	396	332	341	257	215	200	200	279	149
Class 35	2547	2467	2349	2286	2498	2513	2509	2492	2482	2254	1950
Class 36	530	437	441	397	432	425	501	485	483	427	360
Class 37	412	351	350	398	386	337	450	394	428	397	343
Class 38	845	769	726	642	677	705	658	643	653	570	480
Class 39	594	520	540	511	471	474	479	518	499	423	348
Class 40	250	207	252	301	208	230	223	225	235	217	205
Class 41	1352	1351	1234	1050	1191	1335	1302	1418	1402	1341	1048
Class 42	791	717	708	686	709	632	741	664	802	658	636
Class 43	582	585	598	622	592	692	627	647	639	586	521
Class 44	318	270	301	259	307	247	352	390	380	329	309
Class 45	218	195	219	224	217	231	204	197	256	213	170

Source: WIPO Database / Authors' calculation.

Figure 2

Total trademark applicant activity by Nice classes for the period 2010-2020 (Bulgarian and foreign applicants)



Source: WIPO Database / Authors' calculation.

Table 11

Top 10 Nice classes in total trademark activity for the period 2010-2020 (Bulgarian and foreign applicants)

TOP-10 Nice classes	Description	Total trademark	Share (%)
Class 35	Business Services	26347	13,51
Class 41	Education	14024	7,19
Class 05	Pharmaceuticals	11105	5,70
Class 16	Paper Products	10018	5,14
Class 30	Coffee, Sugar, and Other	9421	4,83
Class 09	Scientific Equipment	8517	4,37
Class 42	Scientific and Technological Services	7744	3,97
Class 29	Meat, Fruit, Oil, and Other	7498	3,85
Class 43	Food Services	6691	3,43
Class 03	Detergents	5992	3,07

Source: WIPO Database / Authors' calculation.

The data on the trademark applicant activity of Bulgarian citizens in Bulgaria (see Table 12, Figure 3 and Figure 4) are indicative of the development of Bulgarian business and outline the priority classes under the Nice Classification for applicants, through which they will offer their products.

The dynamics of the Bulgarian trademark applicant activity (see Figure 3) highlight the classes Bulgarian citizens are most interested in by years of the study period.

Table 12

Bulgarian trademark applicant activity by Nice classes for the period 2010-2020

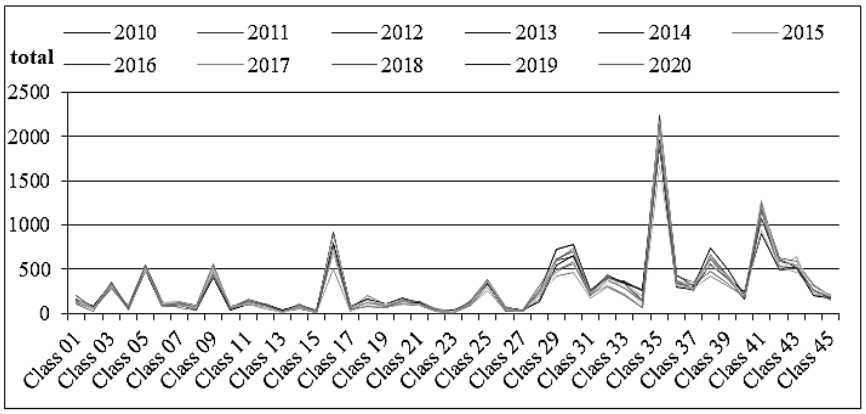
Nice class	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Class 01	148	116	161	153	196	167	127	153	134	104	135
Class 02	84	48	73	74	60	64	46	51	57	29	48
Class 03	321	290	340	324	315	331	278	353	293	357	326
Class 04	58	51	65	52	43	56	90	62	68	49	39
Class 05	501	549	485	492	523	520	541	492	536	523	516
Class 06	97	130	90	77	96	99	124	121	89	84	76
Class 07	100	70	104	91	105	100	139	130	113	119	86
Class 08	46	37	65	48	37	53	87	69	78	69	60
Class 09	506	480	490	414	442	496	546	506	552	432	501
Class 10	73	57	74	38	68	59	70	77	55	48	76
Class 11	113	108	128	108	111	109	163	116	126	147	102
Class 12	99	85	86	71	75	66	102	82	87	86	51
Class 13	31	26	37	40	14	14	13	25	22	19	10
Class 14	83	102	94	75	76	91	88	78	79	44	64
Class 15	13	14	30	12	9	14	16	13	12	15	12
Class 16	898	765	764	791	911	893	742	728	683	750	510
Class 17	74	50	53	81	70	75	57	47	38	55	25
Class 18	161	195	164	160	114	140	140	151	120	81	86
Class 19	111	101	91	105	87	91	83	98	79	65	69
Class 20	167	153	122	112	107	120	150	121	136	149	106
Class 21	115	120	134	114	95	97	138	131	128	127	105
Class 22	34	38	40	40	26	43	45	30	39	24	17
Class 23	13	12	33	11	9	17	19	17	10	5	4
Class 24	130	147	121	105	92	92	114	104	127	96	89
Class 25	343	384	341	333	354	361	386	361	357	294	261
Class 26	48	71	65	44	36	37	51	63	63	27	34
Class 27	23	29	40	41	22	22	38	23	23	22	20
Class 28	242	236	201	137	165	197	311	275	316	273	217
Class 29	719	611	601	539	597	601	608	487	461	485	426
Class 30	785	712	648	656	731	741	691	582	580	563	464
Class 31	251	220	216	236	266	218	237	207	208	197	167
Class 32	421	401	432	406	392	421	413	359	306	385	300
Class 33	344	351	339	353	366	303	329	331	217	288	205
Class 34	149	182	272	251	253	150	146	88	69	126	65
Class 35	2175	2083	1965	1893	2171	2174	2231	2175	2126	1916	1683
Class 36	431	336	361	299	345	322	424	385	368	337	306
Class 37	310	254	264	273	292	276	351	319	330	324	287
Class 38	738	666	637	560	610	636	613	539	549	480	422
Class 39	508	428	436	389	397	409	419	431	387	340	305
Class 40	203	155	215	247	166	188	193	185	182	179	187
Class 41	1198	1176	1064	903	1079	1209	1184	1279	1241	1144	942
Class 42	610	538	528	488	582	501	631	500	604	489	527
Class 43	512	503	519	524	541	636	588	601	544	517	462
Class 44	259	230	250	202	262	212	309	321	319	270	254
Class 45	179	166	178	178	192	211	172	172	196	170	144

Source: WIPO Database / Authors' calculation

There is high trademark activity in the service sector classes (Nice classes from 35 to 45), out of a total of 144 870 classes mentioned in applications for trademark registration, 71 995 classes (49.7%) are in this sector.

Figure 3

Total Bulgarian trademark applicant activity by Nice classes for the period 2010-2020



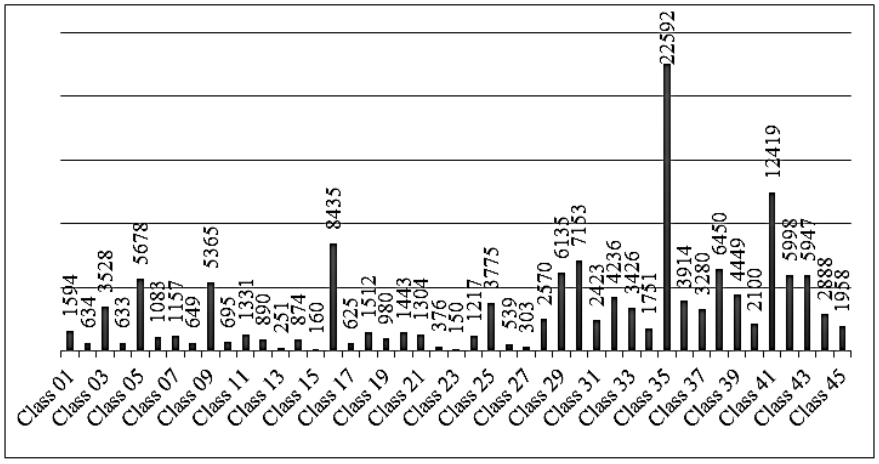
Source: WIPO Database / Authors' calculation.

Information is presented on the total number of classes under the Nice Classification for which trademarks have been applied by Bulgarian applicants (see Figure 4).

Analysing the priority classes for Bulgarian applicants (see Table 13) with the highest overall share among the top 10, the service classes stand out again (36.86%), while the classes related to the production of goods occupy 22.61%. The leading position in services again occupies a class 35 – Business Services followed by: 41 – Education; 38 – Telecommunications; 42 – Scientific and Technological Services; 43 – Food Services. The goods classes in the top 10 include class 16 – Paper Products, followed by: 30 – Coffee, Sugar, and Other; 29 – Meat, Fruit, Oil, and Other; 5 – Pharmaceuticals; 9 – Scientific Equipment.

Figure 4

Bulgarian trademark applicant activity by Nice classes for the period 2010-2020



Source: WIPO Database / Authors' calculation.

Table 13

Top 10 Nice classes in Bulgarian trademark activity for the period 2010-2020

TOP-10 Nice classes	Description	Total trademark	Share (%)
Class 35	Business Services	22592	15,59
Class 41	Education	12419	8,57
Class 16	Paper Products	8435	5,82
Class 30	Coffee, Sugar, and Other	7153	4,94
Class 38	Telecommunications	6450	4,45
Class 29	Meat, Fruit, Oil, and Other	6135	4,23
Class 42	Scientific and Technological Services	5998	4,14
Class 43	Food Services	5947	4,11
Class 05	Pharmaceuticals	5678	3,92
Class 09	Scientific Equipment	5365	3,70

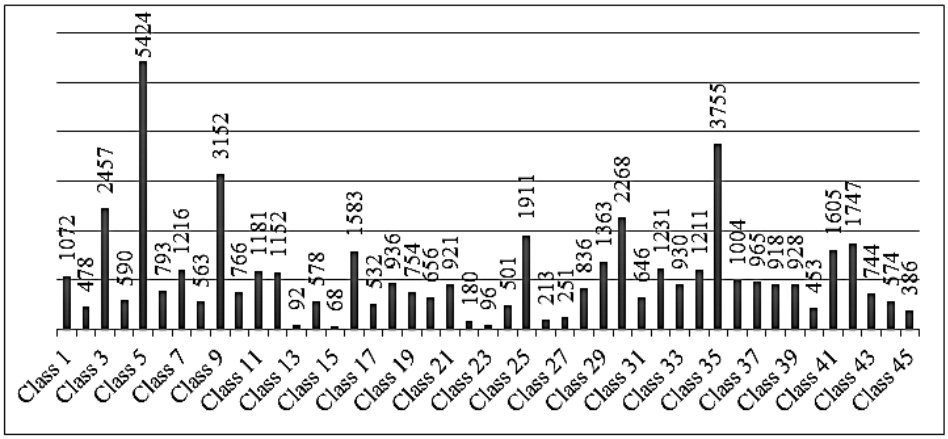
Source: WIPO Database / Authors' calculation.

The analysis of foreign trademark applicant activity in Bulgaria by Nice classes includes all countries and territories (a total of 110) citizens of which have applied for trademarks nationally through the BPO or through the Madrid system (see Figure 5). The presentation of information is limited to the priority 10 classes for foreign applicants (see Table 14).

Analysing the priority classes for foreign trademark applicants (see Table 14), the opposite trend is observed – the classes for goods stand out with the highest overall share among the top 10 (39.79%), while in applications for trademarks, the service classes are indicated in 14.31% of the total number (49680 trademarks applied for).

Figure 5

Foreign trademark applicant activity by Nice classes for the period 2010-2020



Source: WIPO Database / Authors' calculation.

Table 14

Top 10 Nice classes in foreign trademark activity for the period 2010-2020

TOP-10 Nice classes	Description	Total trademark	Share (%)
Class 05	Pharmaceuticals	5424	10.92
Class 35	Business Services	3755	7.56
Class 09	Scientific Equipment	3152	6.34
Class 03	Detergents	2457	4.95
Class 30	Coffee, Sugar, and Other	2268	4.57
Class 25	Clothing	1911	3.85
Class 42	Scientific and Technological Services	1747	3.52
Class 41	Education	1605	3.23
Class 16	Paper Products	1583	3.19
Class 29	Meat, Fruit, Oil, and Other	1363	2.74

Source: WIPO Database / Authors' calculation.

The above gives us reason to conclude that Bulgarian trademark applicants specialise as a priority in the services sector, while foreign applicants focus on the registration of trademarks for the realisation of mainly goods. The largest shares in this respect are pharmaceutical products (Class 5) followed by classes: 9 – Scientific Equipment; 3 – Detergents; 30 – Coffee, Sugar, and Other; 25 – Clothing; 16 – Paper Products; 29 – Meat, Fruit, Oil, and Other. In the service sector foreign trademark applicants are directed to class 35 – Business Services, 42 – Scientific and Technological Services, 41 – Education.

This is in line with the global trend observed in recent years to increase the relative share of the services sector and the deindustrialisation process. At the same time, the limited capacity of production of goods from the "unattractive" economic sectors in Bulgaria makes the national economy dependent on imports.

The preconditions for the mentioned specialisation of Bulgarian and foreign trademark applicants are connected on the one hand with the need for huge investments (costs for technological equipment and know-how) to create competitive products on the market, and on the other hand – investments in marketing communications, advertising and transformation of the registered trademark in a brand recognisable among consumers, which requires a long period of time.

Starting their business with minimal capital, Bulgarian companies do not have the necessary financial resources to develop innovative products or to obtain licenses for the latest technological innovations in a particular sector, the products offered are uncompetitive. This predetermines the enterprises in our country to specialise mainly in labour-intensive industries with low and medium technological intensity. They are most vulnerable to competition from industrialised and emerging economies, which are redirecting their resources to countries with lower labour costs, including Bulgaria.

Foreign companies, on the other hand, enter foreign markets in making economically sound decisions generated on the basis of research on international markets. They have significant financial resources, innovative technologies and an established brand. The foreign trademark

activity testifies to the intentions of the applicants to operate on the territory of the country and use effective ways to protect their intellectual property and future investments. The exports of these companies include competitive and sought-after products on foreign markets, offered under the name of popular brands, guaranteeing quality for the consumer and generating profit for the supplier.

The analysis prepared so far presents data on the specialisation of Bulgarian and foreign trademark applicants. In order to establish the relationship between Bulgarian and foreign trademark applicant activity by economic sector (ISIC/NACE codes) and activities, a System of Concordance between the classes of goods and services under the Nice Classification and the ISIC/NACE classification has been applied.

4.2. Trademark applicant activity by economic sector and economic categories

By applying the derived System of Concordance between the classes of goods and services under the Nice Classification and the ISIC/NACE classification, we direct the Bulgarian and foreign trademark applicant activity to specific sectors (see Table 15) and, as a consequence, to the economic categories specified for the purposes of the study (see Table 16).

In order to examine the degree of match between the Bulgarian and foreign trademark applicant activity, a correlation analysis of the ranks and comparative analysis were applied. The distribution of the total number of classes under the Nice Classification for the trademark applicant activity (Bulgarian – BG and foreign – F) by economic sectors (see Table 15) for the study period 2010-2020 is ranked according to the Bulgarian activity. A total number of classes and a relative share are indicated.

Table 15

Distribution of the classes of the trademark applicant activity of Bulgarian and foreign applicants in Bulgaria by economic sectors for the period 2010-2020 (number and relative share)

Section	Economic sector	BG	%	F	%
C	Manufacturing	84 343	58.22	38512	77.52
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	22 592	15.59	3 755	7.56
M	Professional, scientific and technical activities	17 265	11.92	2 565	5.16
F	Construction	6 360	4.39	2 172	4.37
I	Accommodation and food service activities	5 947	4.11	744	1.5
H	Transportation and storage	4 449	3.07	928	1.87
K **L**	Financial and insurance activities Real estate activities	3 914	2.70	1 004	2.02
	Total	**144 870**	100.0	**49 680**	100.0

Source: WIPO Database / Authors' elaboration and calculation.

The statistical hypotheses verified by correlation analysis are:

H_0 *: There is no link* between the variables studied: classes by economic sector indicated by Bulgarian applicants and classes by economic sectors indicated by foreign applicants for the period 2010-2020

H_1 : There is a link between the variables studied: classes by economic sector indicated by Bulgarian applicants and classes by economic sectors indicated by foreign applicants for the period 2010-2020

Spearman's rank correlation coefficient accepts values in the range of -1.00 to +1.00 and can be interpreted using the scale of Hinkle, Wiersma & Jurs (2003).

After calculations are made according to formula 1, a value for **R_{sp} = 0.857** is obtained, which determines a **very high degree of correlation between the ranks of the variables examined**, i.e. there is a very large match between the rank positions of the economic sectors by Bulgarian and foreign trademark applicant activity.

The results obtained from the test made it possible to reject H_0, according to which there is no link between the variables examined and confirm H_1 for correlation. The value of R_{sp} = 0.857 is statistically significant at a confidence level $p = 0.05$.

Following the application of the System of Concordance between the classes of goods and services under the Nice Classification and the ISIC (see Table 16), a correlation analysis of Spearman's ranks was re-applied. The distribution of the total number of classes under the Nice Classification for trademark applicant activity (Bulgarian and foreign) by economic categories for the study period 2010-2020 is ranked according to the Bulgarian activity. A total number of classes and a relative share are indicated.

Table 16

Distribution of the classes of the trademark applicant activity of Bulgarian and foreign applicants in Bulgaria by economic categories for the period 2010-2020 (number and relative share)

Economic categories	**BG**	**%**	**F**	**%**
1. Business services	26506	18,3	4759	9,58
2. Food & beverages	25427	17,55	7900	15,9
3. Professional, scientific and technical activities	23212	16,02	3309	6,66
4. High-tech	17813	12,3	5817	11,7
5. Chemicals	12067	8,33	10021	20,17
6. Other manufacturing	8435	5,82	1583	3,19
7. Construction	8289	5,72	3625	7,3
8. Clothing & accessories	7569	5,22	3837	7,72
9. Household equipment & facilities	7073	4,88	4085	8,22
10. Transportation	5339	3,69	2080	4,2
11. Metals, machinery & equipment	3140	2,17	2664	5,36
Total	**144 870**	100.0	**49 680**	100.0

Source: WIPO Database / Authors' elaboration and calculation.

The statistical hypotheses verified by correlation analysis are:

H_0 : There is no link between the variables studied: classes of economic categories indicated by Bulgarian applicants and classes of economic categories indicated by foreign applicants for the period 2010-2020.

H_1 : There is a link between the variables studied: classes of economic categories indicated by Bulgarian applicants and classes of economic categories indicated by foreign applicants for the period 2010-2020.

After calculations are made according to formula 1, a value for **R_{sp} = 0.545** is obtained, which determines a **high degree of correlation between the ranks of the variables examined**, i.e. there is a large match between the rank positions of the economic categories in which Bulgarian and foreign citizens exhibit trademark applicant activity.

The results obtained from the test made it possible to reject H_0, according to which there is no link between the variables examined and confirm H_1 for correlation. The value of R_{sp} = 0.545 is statistically significant at a confidence level *p = 0.1.*

The results of the correlation analysis of the Spearman's rank to reveal the degree of match between the Bulgarian and foreign trademark applicant activity by economic sectors and economic activities confirm the working hypothesis of the survey, namely: ***There is a high degree of coincidence between the concentration of the classes of trademark activity by Bulgarian and foreign applicants by economic sectors and economic activities, i.e. foreign applicant activity is directed to economic sectors and activities in which Bulgarian applicant activity is higher.***

In order to identify the economic sectors and activities with the highest concentration of trademarks, where Bulgarian and foreign trademarks activity are highest, they are compared by shares. According to the data from Table 15, in which the ranking is according to the Bulgarian applicant activity, a foreign ranking (see Table 17) has been compiled.

Table 17

Distribution of the classes of the trademark applicant activity of foreign and Bulgarian applicants in Bulgaria by economic sectors for the period 2010-2020 (number and relative share)

Section	Economic sector	F	%	BG	%
C	Manufacturing	38512	77.52	84 343	58.22
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	3 755	7.56	22 592	15.59
M	Professional, scientific and technical activities	2 565	5.16	17 265	11.92
F	Construction	2 172	4.37	6 360	4.39
K **L**	Financial and insurance activities Real estate activities	1 004	2.02	3 914	2.70
H	Transportation and storage	928	1.87	4 449	3.07
I	Accommodation and food service activities	744	1.5	5 947	4.11
	Total	**49 680**	100.0	**144 870**	100.0

Source: WIPO Database / Authors' elaboration and calculation.

The top four positions in the ranking match. The highest Bulgarian and foreign activity by sector was recorded in *sector **C** – Manufacturing*: in 84 343 applications for registration of a trademark (58.22%) of Bulgarian applicants, classes under the Nice Classification were indicated corresponding to this sector, and in foreign activity, these were 38 512 applications (77.52%). The next activity is *sector **G** – Wholesale and retail trade; repair of motor vehicles*

and motorcycles, but with a much smaller share – 15.59% in Bulgarian and 7.56% in foreign trademark applicant activity. The third activity position is *sector **M** – Professional, scientific and technical activities*. It was targeted by 17 265 applications for registration of a trademark by Bulgarian applicants and 2 565 applications from foreign applicants. The fourth sector, where a match is found between Bulgarian and foreign trademark activity, is *sector **F** – Construction*. Its share is 4.39% of Bulgarian activity and 4.37% of foreign activity.

The above gives us reason to conclude that the most developed sectors and economic activities in Bulgaria are of increased interest among foreign applicants. The sectors in which the highest trademark application activity is reported ***(C, G, M, F)*** are also those on which the development of the Bulgarian economy is based. However, in order to unleash the potential for sustainable economic growth in these sectors, it is necessary to focus on investments in the modernisation of technological equipment, and increase productivity and added value, which will increase the level of competitiveness of companies. Otherwise, foreign companies established on the market and their intellectual property rights (patents, trademarks, designs, etc.) will hinder the development of local companies.

According to Table 16 data on the distribution of the classes by economic activities, a similar ranking for foreign applicants has been compiled (see Table 18).

Table 18

Distribution of the classes of the trademark applicant activity of foreign and Bulgarian applicants in Bulgaria by economic categories for the period 2010-2020 (number and relative share)

Economic categories	F	%	BG	%
1. Chemicals	10021	20,17	12067	8,33
2. Food & beverages	7900	15,9	25427	17,55
3. High-tech	5817	11,7	17813	12,3
4. Business services	4759	9,58	26506	18,3
5. Household equipment & facilities	4085	8,22	7073	4,88
6. Clothing and accessories	3837	7,72	7569	5,22
7. Construction	3625	7,3	8289	5,72
8. Professional, scientific and technical activities	3309	6,66	23212	16,02
9. Metals, machinery & equipment	2664	5,36	3140	2,17
10. Transportation	2080	4,2	5339	3,69
11. Other manufacturing	1583	3,19	8435	5,82
Total	**49 680**	100.0	**144 870**	100.0

Source: WIPO Database / Authors' elaboration and calculation.

The economic categories are compared by their rank in both rankings (see Table 16 and Table 18). Matches are revealed only under headings 2, 7 and 10, which correspond to the activities related to: Food & beverages, Construction and Transportation. This allows us to conclude that although there is a large coincidence between the trademark activity of Bulgarian and foreign applicants by economic sector, the redirection of this activity to certain categories (directions) shows that foreign citizens are oriented towards activities to which the Bulgarian applicants are not of strong interest. The data obtained can also be interpreted in the opposite direction, namely: Bulgarian applicants are directed to activities and market niches not yet

employed by strong foreign trademarks and brands. The correct interpretation of those data requires an analysis not only of all applications for registration of a trademark submitted during the study period, but also of the market niches in which products are offered through the trademarks applied for and registered. This will reveal the absence/presence of strong and market-based trademarks and brands, as well as their owners, and will identify market leaders in the defined categories, which goes beyond the scope of this study.

Excluding the above, *the results of the comparative analysis carried out to reveal the degree of coincidence between the Bulgarian and foreign trademark applicant activity by economic sectors fully confirm the working hypothesis of the study. There is a match between 94.61% of the foreign and 90.12% of the Bulgarian trademark applicant activity by economic sector. As regards the economic categories and their directions, the working hypothesis derived is partially confirmed. There is a complete coincidence between 27.4% of the foreign and 26.96% of the Bulgarian trademark applicant activity by economic categories.*

5. Conclusions

Building on existing trademark research, we analyse the approach of authors including Luini & Mangani (2004), Fink, Javorcik & Spatareanu (2005), Millot (2009), Zolas, Lybbert and Bhattacharyya (2016), Grazzi, Piccardo, Vergari (2017), Iversen, & Herstad (2021), as well as the methodology used by WIPO to account for trademark activity by class and economic sectors. As a result, we adapt and propose for the purposes of this analysis a System of Concordance of the trademark applicant activity by class and the economic sectors and activities in the Republic of Bulgaria. The results obtained reveal the economic sectors in Bulgaria, where there is the highest trademark applicant activity.

On the basis of the analyses carried out, the following conclusions can be summarised:

- The conducted correlation analysis of Spearman's ranks confirms the working hypothesis of the study that there is a coincidence between the Bulgarian and foreign trademark applicant activity by economic sectors and economic categories, i.e. foreign application activity is aimed at sectors in which Bulgarian activity is higher. It follows that the sectors of the Bulgarian economy that are of increased foreign interest, manifested in higher trademark activity, can be identified as priorities for economic development.
- The specialisation of Bulgarian trademark applicants is focused mainly on the services sector, which predetermines the high added value (64%) created by the sector in the share of total added value in the country. In terms of production, it focuses on activities of low and medium technological intensity. Prerequisites for this are the global trend towards deindustrialisation and the expressed desire to increase the productivity of intellectual activity, as well as the limited resource base, the technological backwardness, the lack of state priorities, the loss of established markets typical of the Bulgarian economy. Insufficiently developed and with low trademark activity are economic sectors that require high productivity, innovation, research and development, and highly skilled workforce – sectors which form the long-term competitiveness of the country. Targeted activities are needed to achieve sustainable development of the priority sectors, as well

as activities stimulating the development of Bulgarian production and a strategy for imposing Bulgarian goods on the national and international markets. The measures must also be transferred to the company level – developing strategies to establish the trademark among consumers and achieve wide visibility in order to attract more consumers, generate revenue and invest profits in innovation.

- For the period 2010-2020 foreign applicants have shown the greatest interest in the economic sectors ***C*** *– Processing industry,* ***G*** *– Trade; repair of cars and motorcycles,* ***M*** *– Professional activities and research and* ***F*** *– Construction*, in which the concentration of Bulgarian applicant activity is highest. This also predetermines the distribution of 94.61% of the foreign and 90.12% of the Bulgarian trademark applicant activity in the specified economic sectors. The sectors with the largest coincidence in the trademark application activity also reflect the flow of investments after 2009, and according to the Innovation Strategy for Smart Specialization of the Republic of Bulgaria 2014-2020 *"nearly 1/3 of the accumulated investments are in the manufacturing industry ..."* as well as *"trade, repair of motor vehicles and motorcycles (15%)"*, and foreign direct investment is focused on *"important elements of the innovation system (education and ICT), as well as on sectors with potential for development as vehicles (83% increase), electrical equipment (51% increase), food and beverages (30% increase), etc."* (Council of Ministers, 2018, p. 23). In order to prove this statement, it is necessary to conduct additional analyses, which are of interest for further developments.
- In the economic categories, the most significant foreign interest is noted in *Chemicals* and the production of chemical products, followed by: *Food and beverages; High-tech; Business Services; Household equipment and facilities; Clothing and Accessories; Construction; Professional, scientific and technical activities; Metals, machinery & equipment; Transportation; Other manufacturing*. This predetermines the strong dependence of the national economy on foreign investment, as the attractiveness of certain economic sectors and categories for foreign applicants is based primarily on relatively low prices of basic factors (labour, resources, energy) during the analysed period. The stated interest in these categories is also indicative of the export orientation of the Bulgarian economy.

The proposed study is the first step towards a more serious and in-depth analysis of the structure of trademark activity in Bulgaria. The concordance of the thematic content of the most developed economic sectors (ISIC / NACE codes) with that of the classes of goods and services according to the Nice Classification, as well as the similarity between the economic sectors with the most pronounced applicant interest and the data on investment activity in the country are proof of the effectiveness of the developed System. The analyses of the trademark activity presented in the study show how by using the maintained statistics for the objects of industrial property and, in particular, for the trademarks and by applying the derived System of Concordance, the priority and most promising for the development of economic sectors can be identified. This brings out trademark activity as a valuable and unique information resource. The System can be used to connect trademarks with different economic indicators, measuring foreign direct investment, gross domestic product, corporate representation, product differentiation, etc.

Subsequently, this analysis may cover other objects of industrial property (patents), seeking a link between the concentration of foreign patent activity (Georgieva & Nikolova-Minkova, 2020) and the concentration of trademark activity, as well as to reveal technological directions and economic sectors and divisions that are priorities for economic development.

The use of the System of Concordance of the classes of goods and services can be expanded in the following directions:

- disclosure of the export and import specialisation of Bulgaria and its connection with the trademark application activity;
- disclosure of the connection between the investment flows, the trademark activity and the development of the priority economic sectors;
- study of the connections and regularities between the intensity of the trademark activity of foreign applicants and indicators such as gross domestic product, foreign direct investment, etc.;
- analysing of the trademark application activity at the company level – formation of the structure of the individual economic sectors in terms of the number and size of companies operating in the sector and their trademark activity.

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