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Level of development of e-commerce in EU countries*

1. Introduction

E-commerce in Europe is becoming increasingly important in all market segments, and in most of them it already accounts for several to even several dozen percent of the total trade. Europeans use this form of shopping more and more often, and with the development of society and its computerisation, this form of shopping has a growing share. In terms of turnover, the European e-commerce market is the largest market of this type in the world. According to a report by E-commerce Europe association, it has already distanced the US market in 2010. The analysis of available statistical data shows that the growth of revenues in Great Britain, Sweden and Norway was within the range of 10-15%, while in Germany, France, Italy and Spain the dynamics fluctuated around 20-25%. However, the largest increases were recorded by the countries of Southern and Eastern Europe. Their growth rate ranged from 30% to 40% per annum. High positions in this group were taken by Russia, Poland, Ukraine, Turkey and Greece (Yongen, Weening, 2013, p. 9). Year

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by year, the willingness to buy products, which until recently were not treated by many consumers as “online”, such as food products, is growing.

Considering the above, the aim of the article is to determine the level of development of e-commerce in the European Union (EU-28). The implementation of such an objective was carried out in two stages. Considerations in the first stage were focused on explaining the nature of e-commerce and the determinants of its development. Then, using the Hellwig’s development pattern method (1968), a linear ordering of the analysed objects (EU Member States) was carried out using EUROSTAT data. Moreover, a grouping of EU countries in terms of similarity of the level of development of e-commerce by means of the so-called threshold method (Wysocki 2010) was also carried out (Wysocki 2010). The analysis was carried out in two periods, i.e. in 2014 and 2018, which allowed assessing the direction of changes in the analysed countries¹.

2. The essence of e-commerce

The term electronic commerce (e-commerce), e-commerce in its original wording, was introduced in 1997 by IBM, and in general it is the sale of goods and services through the use of technology and telecommunications infrastructure. E-commerce is therefore a type of e-business activity focusing on and around individual transactions using the Internet and/or traditional ICT tools as an exchange medium (Hartman et al., 2001). According to Philip Kotler (2002), e-commerce is a generic term used to describe the buying and selling processes supported by electronic devices. E-commerce can be divided into the following categories:

- B2B (business to business) - companies are involved in the transaction, the fastest growing branch of e-commerce,
- B2C (business to consumer) - the transaction involves the company as the seller on one side and the consumer as the buyer on the other,
- C2B (consumer to business) - the transaction involves the consumer as the seller on one side and the company as the buyer on the other,
- C2C (consumer to consumer) - consumers participate in the transaction.

1 This period results from the availability of statistical data. Only from 2014 onwards. Eurostat publishes data on the indicators analysed in the article for all EU Member States. The latest data are from 2018.

With regard to state administration (Bartczak, 2016), e-business can be divided into:

- B2G (or B2A) (business to government or business to administration) - the transaction involves representatives of the business sector and public administration; it covers transactions between pre-businesses and public administration, such as bribery orders or tenders,
- G2B (government to business) - covers the flow of economic information (customs documents, statistics) from offices to enterprises,
- G2C (government to citizen) - refers to the flow of administrative information from offices to citizens,
- C2G (consumer to business) - the transaction involves the consumer on one side and the public administration on the other,
- G2G (government to government) - cooperation between public administration bodies, thanks to which internal processes are coordinated.

3. Conditions for the development of e-commerce in the EU

From the supplier's point of view, organization of e-commerce helps to reduce the costs of maintaining retail space, reduce administration, enables sales 24 hours a day. Moreover, from the supplier's point of view, the use of Internet technologies makes it easier for companies to collect information about the purchase structure of their buyers and about themselves, enabling personalized, interactive communication between the company and its customers. From the consumer's point of view, it also has many advantages - thanks to the use of this channel, it has the possibility of unlimited comparison of offers regardless of the time of day. However, there are certain limitations in the form of lack of physical contact with the product, inability to try it out or get to know the goods in person, the need to incur shipping costs, or a high degree of uncertainty as to the reliability of the seller. In an online transaction, trust is the starting point for the consumer's interest in the offer, as there must be a minimum acceptable level of consumer trust in the supplier of the product (Barska, 2014).

Available data from Ecommerce Europe (2016) shows that the value of online sales in Europe was already over €455 billion in 2015 and reached €510 billion in 2016. Therefore, the market is still growing dynamically. Europeans' expenditures on online shopping in 2015 were the highest in the UK, where it amounted to EUR 3625 per person, and the lowest in Bulgaria - EUR 262. On average, every European e-consumer spends almost EUR 1540 per year. Apart

from the inhabitants of Great Britain, significant expenditures on shopping in this way are borne by the inhabitants of Ireland, Scandinavian countries, Switzerland and France. Considering this fact, it can be noted that the ten largest markets in Europe in 2015 are Great Britain (157 billion EUR), France (65 billion EUR), Germany (60 billion EUR), Russia (20 billion EUR), Spain (18 billion EUR), Italy (17 billion EUR), the Netherlands (16 billion EUR), Denmark (12 billion EUR), Sweden (10 billion EUR) and Switzerland.

The factors determining the development of e-commerce are therefore factors of both demand and supply. One of the important factors is the progress in information and telecommunication Technologies (Sipa, Gorzeń-Mitka, Skibiński, 2015). It is worth noting that in recent years the number of Internet users has been growing from year to year by about 15% on average. In 2018 already 89% of households in the EU-28 countries have had access to the Internet. Thus, the Internet penetration rate is growing rapidly. The percentage of people who made purchases via the Internet is growing dynamically. In the countries of the European Union (EU-28), in 2017 this percentage increased by 12% compared to 2009. Another factor conducive to the development of e-commerce is a visible increase in the average speed of Internet connections. In the last five years, the average line speed tripled from 2 Mb/s in 2011 to over 6 Mb/s in 2016. This enables faster data transmission and more efficient transaction execution) Another such factor is increasing Internet content (in 2009-2016, the number of websites increased almost five times from 238 million to 1 124 million) (Gregor & Kalińska-Kula, 2018). An important factor for consumers is their ability to use computers and mobile devices used for the Internet. These skills are manifested by the frequency of Internet use, which is used daily by around 76% of Europeans. The leaders in this area are the inhabitants of Denmark 92%, while this rate was 55% and 53% in Bulgaria and Romania, respectively. Analyzing the place of use of the Internet, it is worth noting that the majority of the community uses it while staying at home. The development of e-commerce is also closely related to the increasing use of the Internet by enterprises. In 2018, 97% of entities operating in the EU-28 had access to the Internet, in some countries even 100%. 25% of companies received an order via computer networks, and almost every sixth company achieved at least 1% of revenues from sales via the Internet. The development of the e-commerce market depends on the integration of information systems of market participants, which enable support of supply chain processes and close cooperation between companies.

4. Test method

In order to organize the EU countries according to the level of development of e-commerce, the Hellwig's development pattern method was used (1968). This method is used by scientists and practitioners of many fields. Particularly, it is often used in social sciences research (e.g. Jędrzejczak-Gas and others, 2018; Kuziak, Piontek, 2018; Malinowski 2017; Pawlewicz 2015). The calculations were carried out on the basis of secondary sources based on Eurostat data. The research was conducted for two years, i.e. for 2014 and 2018. Empirical data, including objective indicators describing e-commerce, were collected in spatial terms for 28 EU countries. Initially, 14 indicators were proposed, which determine the e-commerce of the countries surveyed. Their selection was dictated by the possibility of obtaining relevant statistical information. The proposed set of indicators is a potential set of variables. These are as follows:

- X1 - share of enterprises that received orders via computer networks in the total number of enterprises (in %),
- X2 - share of enterprises with Internet sales (at least 1% of turnover) in the total number of enterprises (in %),
- X3 - share of enterprises that received the order via website or application (Internet sales) in the total number of enterprises (in %),
- X4 - share of enterprises selling via website or application - B2B and B2G in the total number of enterprises (in %),
- X5 - share of companies selling via website or application - B2B and B2G in the number of companies selling online (in %),
- X6 - share of enterprises selling via a website or B2C application in the total number of enterprises (in %),
- X7 - share of enterprises selling via a website or B2C application in the number of enterprises selling online (in %),
- X8 - share of persons who have made an online purchase in the last 3 months in the total number of people (in %),
- X9 - share of persons who ordered goods or services over the Internet, for private use, more than a year ago or never ordered in the total number of persons (in %),
- X10 - share of persons who did not encounter any problems when buying / ordering goods or services via the Internet for private use in the total number of persons (in %),
- X11 - share of persons who did not encounter problems when buying / ordering goods or services over the Internet for private use in the number of persons

- who ordered goods or services over the Internet for private use in the last year (in %),
- X12 - share of persons who did not encounter any problems when buying / ordering goods or services via the Internet for private use in the number of persons who used the Internet during the last year (in %),
- X13 - share of persons who have not ordered goods or services via the Internet in the last 12 months because they do not have the necessary skills in the total number of persons (in %),
- X14 - share of persons who have not ordered goods or services online in the last 12 months because they do not have the necessary skills in the number of persons who ordered goods or services online, for private use, more than a year ago or have never done so (in %).

The initial list of variables has been statistically treated. Diagnostic features were selected from among all variables. The reduction of variables corresponded to the accepted methodological requirements, so that the obtained description did not falsify reality. In accordance with the adopted procedures (Nowak 1997, p. 12; Zeliaś 2000, pp. 36-41), the indicators for which the coefficient of variation was lower than the threshold value of this coefficient of variation amounting to 10% were eliminated from the set of variables. The calculations show that the coefficient of variation for variable X7 is lower than the threshold value ($V^*=10\%$), therefore this variable was eliminated from further research.

Next, the analysis of the calculated matrix of correlation coefficients was undertaken. It was concluded that the variables adopted for the study are characterized by different degrees of correlation. Due to the strong correlation of some variables (it was assumed that the critical value of the correlation coefficient r^* was 0.7), variables X1, X3, X4, X6, X9, X10, X14 were eliminated from further research.

Taking into account the substantive and statistical criteria (high coefficient of variation, low correlation of variables), as well as the criterion of availability of statistical information, the following diagnostic features were adopted for further research: X2, X5, X7, X8, X11, X12, X13.

Among the features accepted for analysis, six were stimulants (X2, X5, X7, X8, X11, X12), while one was a destimulant (X13). This variable was transformed into a stimulant using a formula: where are implementations of the destimulant, and stands for a constant (Zeliaś 2000, pp. 36-41).

At a later stage of the analysis, the variables were treated as equally significant, assuming a system of unit weights. The data set was then standardised according to the formula:

$$z_{ij} = \frac{x_{ij} - \bar{x}_j}{S_j}$$

Where:

- z_{ij} - normalised values of the j -th diagnostic variable in the i -th object,
- x_{ij} - empirical values of the j -th diagnostic variable in the i -th object,
- \bar{x}_j - the arithmetic mean of the j -th diagnostic variable,
- S_j - standard deviation of the j -th diagnostic variable.

The next stage of research was the construction of a synthetic meter according to the Hellwig's development pattern method. For this purpose, the reference object z_0 consisting of the best values for each characteristic $z_{0j} = [z_{01}, z_{02}, \dots, z_{0m}]$ was determined for the standardized features:

$$z_{0j} = \begin{cases} \max_i \{z_{ij}\}, & \text{when } z_j \text{ is a stimulant} \\ \min_i \{z_{ij}\}, & \text{when } z_j \text{ is a destimulant} \end{cases}$$

Then, the similarity of the objects to the abstractly best object was examined by calculating the Euclidean distance of each object from the pattern of development according to the following formula:

$$d_{i0} = \sqrt{\frac{1}{n} \sum_{j=1}^m (z_{ij} - z_{0j})^2}, \quad i = 1, 2, 3, \dots, n$$

The last stage of the research was to determine the synthetic measure according to the formula:

$$s_i = 1 - \frac{d_{i0}}{d_0}, \quad i = 1, 2, 3, \dots, n, \quad d_0 = \bar{d}_0 + 2S_d$$

Where:

- \bar{d}_0 - arithmetic mean of the coordinates of the vector d_0 ,
- S_d - standard deviation of vector coordinates d_0 .

From formula $s_i \in [0; 1]$, $\max_i \{s_i\}$ – the best object, $\min_i \{s_i\}$ – the worst object. As part of the conducted research, EU countries were also grouped in terms of similarity of the level of development of e-commerce using the so-called

threshold method (Wysocki, 2010). Four groups of countries characterized by different levels of e-commerce development were distinguished: These are countries with a very high level of e-commerce development for which $S_i \geq \bar{S}_i + S_{S_i}$; II are countries with a high level of development for which $\bar{S}_i + S_{S_i} > S_i \geq \bar{S}_i$; III are countries with a medium level of e-commerce development for which $\bar{S}_i > S_i \geq \bar{S}_i - S_{S_i}$; IV are countries with a low level of e-commerce development for which $S_i < \bar{S}_i - S_{S_i}$ (where \bar{S}_i is the arithmetic mean of the value of the measure and S_{S_i} is the standard deviation).

5. Research results and discussion

The conducted research shows that in the analysed period the highest values of the synthetic measure and the highest positions in the ranking of countries due to the level of development of e-commerce were taken by Germany, Denmark and the Czech Republic, while the lowest by Romania, Bulgaria, Malta and Cyprus (table 1).

In the analysed period, 16 EU countries recorded an increase in the synthetic measure, which means that the level of development of e-commerce in these countries increased. However, in the case of 12 EU countries, the synthetic measure has decreased, which means that the development of e-commerce in these countries has slowed down or decreased. The largest increase in the value of the synthetic measure was recorded by the following countries: Slovenia, Sweden, the Czech Republic, Denmark, Cyprus, Hungary, Poland, Slovakia. On the other hand, the biggest drop in the value of the synthetic measure was recorded by Germany, Great Britain, Ireland, Croatia, Luxembourg. Small changes in the value of the synthetic indicator were recorded by Italy, Spain, Romania (table 1).

Table 1. Synthetic measure and ranking of EU countries by the level of development of e-commerce

Country	2014		2018	
	Syntetic measure	Rank	Syntetic measure	Rank
Germany	0,856596	1	0,722311	1
Denmark	0,580529	2	0,662896	2
Czechia	0,507789	3	0,606973	3

Netherlands	0,498257	4	0,474284	7
Estonia	0,482052	5	0,507496	5
Ireland	0,469127	6	0,379108	12
Belgium	0,463994	7	0,505554	6
Croatia	0,430350	8	0,357813	15
United Kingdom	0,413174	9	0,285487	19
Sweden	0,405876	10	0,514502	4
Slovakia	0,403303	11	0,456495	8
Austria	0,393479	12	0,352597	16
Poland	0,384637	13	0,443899	9
Spain	0,381385	14	0,375644	13
Latvia	0,372280	15	0,328791	17
Finland	0,353944	16	0,380246	11
Lithuania	0,332024	17	0,359012	14
Greece	0,302465	18	0,261065	20
Slovenia	0,292034	19	0,410867	10
France	0,269834	20	0,326176	18
Luxembourg	0,264283	21	0,202529	22
Italy	0,191660	22	0,196253	24
Hungary	0,175772	23	0,238548	21
Portugal	0,174306	24	0,197328	23
Bulgaria	0,133686	25	0,036087	27
Malta	0,092537	26	0,043127	26
Cyprus	0,056840	27	0,136559	25
Romania	0,014470	28	0,029176	28

Source: own elaboration based on Eurostat data

The change in the value of the synthetic measure influenced the position of individual EU countries in the ranking differently. Six countries did not change their rank, including the first three countries (Germany, Denmark, the Czech Republic). It should be noted that Germany recorded the biggest decrease in the value of the synthetic measure², yet it is still in the first place in the ranking of countries. This shows that the country has a high level of e-commerce development compared to other EU countries and there is a large difference in the level of e-commerce development between Germany and the rest of the EU. In turn, Denmark and the Czech Republic, which were ranked 2nd and 3rd in 2014, strengthened their position on these positions in 2018 (in these countries the synthetic indicator increased³) (table 1).

12 countries experienced an increase in their ranking, while 10 countries had a decrease. Countries with a significant progress in the development of e-commerce (increase in the synthetic measure) and a significant increase in the ranking are primarily Slovenia (shift in the ranking by 9 places⁴), Sweden (shift in the ranking by 6 places⁵) and Finland (shift in the ranking by 5 places⁶). Cyprus is an interesting example, with a fairly high increase in the synthetic indicator⁷, but moved only by 2 places in the ranking and is still a country which,

2 In particular, the share of enterprises selling via the Internet in the total number of enterprises decreased (by over 13%) and the share of enterprises selling via a website or an application - B2B and B2G - in the number of enterprises selling via the Internet (by over 10%).

3 In the case of the Czech Republic, the main increase was in the share of people who purchased online in the last 3 months in the total number of people (48% increase) and in the share of people who did not encounter problems when buying or ordering goods or services online for private use in the number of people who used the Internet in the last year (19% increase).

In Denmark, the share of Internet sales companies in the total number of companies has mainly increased (23% increase).

4 This increase results from an improvement in all the indicators surveyed. The highest increase was observed in the share of people who purchased online in the last 3 months in the total number of people (50% increase).

5 The share of enterprises selling via the Internet in the total number of enterprises increased mainly (20% increase) and the same trend applied to share of persons who did not encounter any problems when buying / ordering goods or services via the Internet for private use in the number of persons who used the Internet in the last year (20% increase).

6 The share of enterprises selling via the Internet in the total number of enterprises increased mainly (40% increase).

7 The share of enterprises selling via a website or an application - B2B and B2G - in the number of enterprises selling via the Internet increased mainly (44% increase) and the same trend applied to share of people who did not encounter problems when buying or ordering goods or services online for private use in the number of people who used the Internet in the last year (24% increase) and the share of enterprises selling via the Internet in the total number of enterprises (20% increase).

compared to other EU countries, is characterized by a low level of development of e-commerce. In the case of Cyprus, therefore, there has been significant progress in the development of e-commerce, but the gap in the level of this development between Cyprus and other EU countries is so large that the country has not significantly changed its position in the ranking.

In the case of 10 countries, their position in the ranking decreased, which indicates a slowdown or decrease in the development of e-commerce. The countries that recorded the biggest decline in their ranking were the United Kingdom (10 places decrease⁸), Croatia (7 places decrease⁹), Ireland (6 places decrease¹⁰), Austria (4 places decrease¹¹).

Table 2 presents the results of the grouping of EU countries in terms of similarities in the level of development of e-commerce.

In 2014, the first group, i.e. the group with the highest level of e-commerce development consisted of only two countries (Germany and Denmark), which accounted for about 7% of all EU countries. In 2018, the Czech Republic joined the group.

The most numerous is the second group, which in 2014 consisted of 14 EU countries (50%), and 13 countries in 2018 (46.4%). In 2018, this group was joined by Slovenia and Lithuania, which in 2014 belonged to the group of countries with a medium level of development of e-commerce. In 2018 group II was left by the Czech Republic, which recorded an increase in the level of development of e-commerce and moved to group I and the United Kingdom and Latvia, which recorded a significant decrease in the level of development of e-commerce and moved to group III.

Group III is quite large, which is characterized by the average level of development of e-commerce. In both 2014 and 2018 this group included countries

8 In particular, the share of enterprises selling via a website or an application - B2B and B2G - in the number of enterprises selling via the Internet decreased (by over 11%) and the share of people who did not encounter problems when buying or ordering goods or services online for private use in the number of people who used the Internet in the last year (by over 11%).

9 In particular, the share of enterprises selling via the Internet in the total number of enterprises decreased (by over 10%) and the share of people who did not encounter problems when buying or ordering goods or services online for private use in the number of people who used the Internet in the last year (by over 8%).

10 In particular, the share of enterprises selling via a website or an application - B2B and B2G - in the number of enterprises selling via the Internet decreased (by over 17%).

11 Only the share of enterprises selling via a website or application - B2B and B2G - in the number of enterprises selling via the Internet decreased, other indicators remained unchanged or improved.

such as France, Greece, Luxembourg, Portugal, Hungary and Italy. On the other hand, group IV, i.e. the group characterized by a low level of e-commerce development both in 2014 and 2018, included 4 countries (Cyprus, Bulgaria, Romania, Malta). These are the countries with the lowest level of development of e-commerce among all EU countries.

Table 2. Results of the grouping of EU countries by the level of e-commerce development

Group	Development level	Grouping rule	Country
2014			
I	Very high	$z_i \geq 0,5226$	Germany, Denmark
II	high	$0,5226 > z_i \geq 0,3463$	Czechia, Belgium, Sweden, Estonia, Poland, Slovakia, Netherlands, Ireland, Croatia, Spain, United Kingdom, Finland, Austria, Latvia
III	medium	$0,3463 > z_i \geq 0,1700$	Slovenia, Lithuania, France, Greece, Luxembourg, Portugal, Hungary, Italy,
IV	low	$z_i < 0,1700$	Cyprus, Bulgaria, Romania, Malta
2018			
I	Very high	$z_i \geq 0,5277$	Germany, Denmark, Czechia
II	high	$0,5277 > z_i \geq 0,3497$	Belgium, Sweden, Estonia, Poland, Slovakia, Netherlands, Ireland, Croatia, Slovenia, Spain, Finland, Lithuania, Austria
III	medium	$0,3497 > z_i \geq 0,1716$	United Kingdom, Latvia, France, Greece, Luxembourg, Portugal, Hungary, Italy
IV	low	$z_i < 0,1716$	Cyprus, Bulgaria, Romania, Malta

Source: own elaboration based on Eurostat data

6. Conclusion

The growing importance of the Internet as a distribution channel for goods and services is seen in 57% of the countries surveyed. The expansion of the Internet and the development of broadband networks increase the number and value of transactions concluded electronically. The development of e-commerce

is observed not only among enterprises from the commercial sector, but also from other sectors of the economy, e.g. industry, hotel industry, insurance, as well as public administration. The conducted research indicates that the pace and directions of development of e-commerce in the EU countries are diversified, which may be a result of numerous barriers existing in the countries surveyed. Barriers to the development of e-commerce may be intentional, i.e. caused deliberately (trade bans or transport restrictions) or due to other reasons. The factors that hamper the development of e-commerce are: infrastructural deficiencies (inadequate payment and delivery systems, insufficient distribution of fast communication networks and advanced technological solutions), lack of information for online service providers and lack of Internet users' protection, too many abuses and disputes difficult to resolve, export and import restrictions, mental barriers for consumers (Łapiński et al., 2012).

The ranking shows that the younger EU Member States are clearly eliminating the recent technological backwardness in this area, trying to eliminate their distance to the leaders and even shifting their positions in the overall ranking. The potential of these countries is much greater, especially given the relatively low share of the population of these countries engaged in cross-border online trade. The promotion of the Czech Republic to the group of countries with very high development of e-commerce may be the result of the highest absolute percentage growth of people who did not encounter problems when buying / ordering goods or services via the Internet for private use. The situation of Malta and Cyprus in the group of countries with a low level of development may be a consequence of a large share of people who declare a lack of necessary skills to carry out such transactions (43% and 30% respectively), while Bulgaria and Romania have poor Internet infrastructure and access to it. On the other hand, such a drastic decrease in the position of the United Kingdom in 2018 compared to 2014 in the ranking of the level of development of e-commerce is a result of a decrease in the number and value of transactions executed in this way. This may be a reaction to the plans of the UK to leave the European Union, initiated by the referendum in June 2016.

Summary

Level of development of e-commerce in EU countries

E-commerce in Europe is becoming increasingly important in all market segments, and in most segments it already accounts for few or even several dozen percent of total trade. According to a report by E-commerce Europe, it has already left the US market behind

in 2010. Year by year, the willingness to buy products, which until recently were not treated by many consumers as “online”, such as food products, is growing.

Considering the above, the aim of the article is to determine the level of development of e-commerce in the European Union (EU-28). In the research procedure the literature and EUROSTAT data were used. The following research methods were used for data analysis: literature analysis, the Hellwig’s method and the threshold grouping method. The analysis was carried out in two periods, i.e. in 2014 and 2018, which allowed assessing the direction of changes in the surveyed.

Keywords: *e-commerce, development, EU-28 countries, Hellwig method.*

Streszczenie

Poziom rozwoju e-commerce w krajach UE

Handel internetowy w Europie ma coraz większe znaczenie we wszystkich segmentach rynku, a w większości segmentów stanowi już od kilku do nawet kilkudziesięciu procent przypadający na cały handel. Według raportu stowarzyszenia E-commerce Europe, już w 2010 roku zdystansował on rynek USA. Z roku na rok rośnie skłonność do zakupu produktów, które do niedawna nie były traktowane przez wielu konsumentów za „internetowe” jak np. produkty spożywcze.

Celem artykułu jest określenie poziomu rozwoju handlu internetowego w krajach Unii Europejskiej (UE-28). W postępowaniu badawczym wykorzystano literaturę dotyczącą badanej problematyki oraz dane EUROSTAT. Do analizy danych wykorzystano następujące metody badawcze: analizę literatury, metodę Hellwiga oraz progową metodę grupowania. Analiz dokonano w dwóch okresach, tj. w roku 2014 oraz 2018, co pozwoliło na ocenę kierunku zmian w badanych.

Słowa

kluczowe: *e-commerce, rozwój, państwa EU-28, metodę Hellwiga.*

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Classification: L81, F1.

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