

Consumer Behavior and COVID-19: Comparing Purchase Incentives and Ecological Awareness Changes

Nataliia Letunovska¹, Yevheniia Ziabina², Oleksii Lyulyov^{1,2}, and Tetyana Pimonenko^{1,2*}

¹Sumy State University, Department of Marketing, 2, Rymkogo-Korsakova St, 40007 Sumy, Ukraine;

²Department of Management, Faculty of Applied Sciences, WSB University, 41-300 Dabrowa Gornicza, Poland.

Abstract. The authors concluded that no single theory could unambiguously explain what factors influence the behavior of consumers of healthy segment products. Scientific studies and experimental primary data were analyzed, and generalizations were made regarding what most influences consumers' decisions to purchase a product. A methodology for selecting consumer behavior models in the segment of healthy products was developed based on a combination of criterion features of addressability, emotionality and ecological awareness, which made it possible to formalize the types of consumer behavior models and substantiate the prevailing decision-making criteria for each of them. For different models, the purchase of the product will be influenced by its factors. The products of the healthy segment are not the kind of products that the vast majority buy after weighing and considering the decision. The basis for developing an optimal set of marketing communication tools has been formed.

1 Introduction

The 2023 year after the shape phase of the COVID-19 pandemic, and one definitely could formulate several questions:

- How has COVID-19 affected consumer behavior and marketing strategies as a whole?
- How are consumers taking control of their health and well-being in the complex?
- How can brands in health succeed in times of pandemic and postpandemic?

Pandemic times help to realize that a healthier population is not only more productive but also helps society enormously in health crises. People with no chronic illnesses are much less at risk of becoming seriously ill from COVID-19. Therefore, the behavioral patterns of the population, its ecological awareness and willingness to maintain a healthy lifestyle are in the foreground. Ukraine is one of the countries seeking to curb the explosion of chronic diseases associated with, among other things, excessive consumption of ultra-processed foods. Communication with stakeholders of the national economy regarding promoting healthy consumption and consolidating a healthy lifestyle is gaining relevance. For an effective marketing strategy of these actions, it is appropriate to group the target audience for its

* Corresponding author: tetyana_pimonenko@econ.sumdu.edu.ua

specification in terms of aspects of influence that determined the appropriateness of this study.

2. Literature Review

Based on the methodology in the papers [1–5], this study provided a bibliometric analysis to identify the consumer trends in the segment of healthy products that are dynamically changing and expanding. At the same time, the COVID-19 pandemic has provoked changes in consumer habits. For example, interest in healthy products and personal protective equipment has increased. The conducted bibliometric analysis demonstrates the growth of publication activity for the search terms "consumer trend" and "healthy product" in the scientometric databases Scopus and Web of Science since 2000 (Fig. 1).

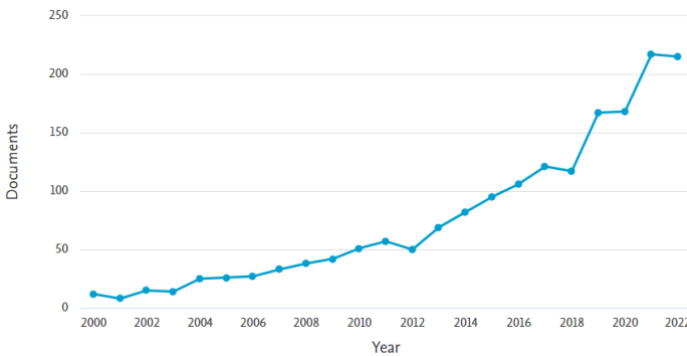


Fig. 1. Dynamics of publishing activity for the search terms "consumer trend" and "healthy product" in the scientometric databases Scopus and Web of Science, 2000-2022.

It is appropriate to pay attention to the areas of research publications. The largest number of scientific publications were in the fields of agricultural and biological sciences (808 publications), (338 publications), engineering (299 publications), business, management and accounting (273 publications) and social sciences (216 publications).

At the same time, the geography of publishing activity is quite wide (Fig. 2).

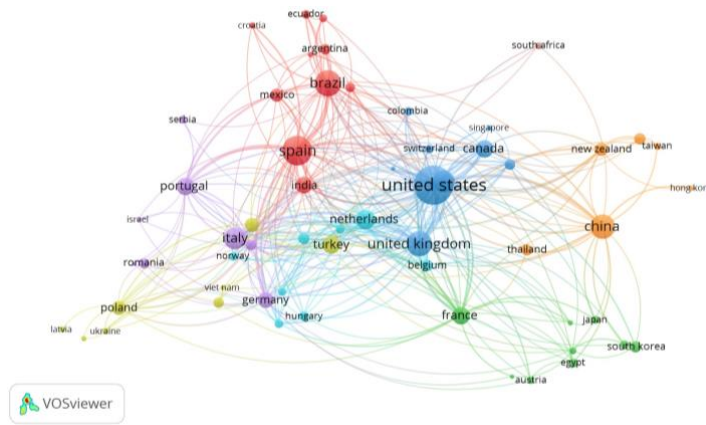


Fig. 2. Geography of publication activity by search terms "consumer trend" and "healthy product" in the scientometric databases Scopus and Web of Science

In Figure 2, it can be seen that the largest number of scientific studies were published by representatives of the USA (314 publications), Spain (180 publications), Brazil (137 publications), Great Britain (129 publications) and China (118 publications).

As part of the study, a more detailed analysis of the most cited publications using the search terms "consumer trend" and "healthy product" in the scientometric databases Scopus and Web of Science was conducted in the fields of research "Business, Management and Accounting" and "Economics, Econometrics and Finance" (table 1).

Table 1. Field-Weighted Citation Impact of the Top 5 Cited Articles

№	Title of the article	The authors	Year	Journal	Number of citations	Field-Weighted citation impact
1	The value of fast fashion: Quick response, enhanced design, and strategic consumer behavior	Cachon G.P., Swinney R.	2011	Management Science	416	8.97
2	Green claims and message frames: How green new products change brand attitude	Olsen M.C., Slotegraaf R.J., Chandukala S.R.	2014	Journal of Marketing	264	5.57
3	Living like a local: Authentic tourism experiences and the sharing economy	Paulauskaite D., Powell R., Coca-Stefaniak J.A., Morrison A.M.	2017	International Journal of Tourism Research	229	9.31
4	Ethical and responsible tourism: Consumer trends in the UK	Goodwin H., Francis J.	2003	Journal of Vacation Marketing	217	3.21
5	Consumer effects of front-of-package nutrition labeling: an interdisciplinary meta-analysis	Ikonen I., Sotgiu F., Aydinli A., Verlegh P.W.J.	2019	Journal of the Academy of Marketing Science	166	9.77

The articles with the largest number of citations examine the consumer impact of nutrition labeling on product packaging [11], consumer attitude toward responsible and ethical aspects of tourism [12; 13], the effect of the introduction of new ecological products on brand attitudes [14] and analysis of the impact of changing trends under the condition of strategic behavior [15].

Additionally, by the authors [1], the impact of consumer trends in the segment of healthy products on public health is investigated [16–35] and consumer demand satisfaction [7] in a sustainable development context [36–49].

Sufficient attention is given to the analysis of brand formation and development [8;16–22] in the conditions of the pandemic, taking into account the trends of healthy consumption. Additionally, it is necessary to pay attention to publications in which the effectiveness of marketing audits is investigated [9] as a marketing optimization tool [50–71] when forming a company's environmental strategies [10].

Scientific works in the field of analysis of the relationship between the consumption of nonrenewable resources and added value and health protection in the context of industrial

development are popular [1;72–88]. The authors conducted a comparative analysis of financial support during the COVID-19 pandemic [89–107], and the main tools for influencing consumer trends in the segment of healthy products are presented.

In more detail, in the works of domestic and foreign scientists, consumer trends in the segment of healthy products during the pandemic are investigated [108–124].

3 Methods

For the selection of models of consumer behavior regarding making a decision on the choice of healthy products, an online survey method using the SurveyPlanet service was used. A total of 384 people participated in the survey, of which 66.7% were women and 33.3% were men; more than 70% of respondents were representatives of the Millennial (Y) and Zoomer (Z) generations. Among the respondents, 28% were studying, 55% were employed, 9% were retired, and 8% were unemployed. The following formula was used to determine the sample size:

$$n = \frac{Z^2 \cdot p \cdot (1-p)}{E^2}, \quad (1)$$

where n – sample size; Z – reliability coefficient, which corresponds to the confidence level; p – assessment of the probability of choice; and E – error.

The classification of models is based on a combination of three criteria: the addressability of the purchase (defined by the target group (to myself, to myself or other people, to other people)); emotionality (determined by the prevailing emotion (impulse, habit, prudence)); ecological awareness (determined by the level of knowledge about product ecological labeling (does not understand the labeling and has never encountered it; noticed the labeling, but does not understand it; understands the meaning of the labeling but does not pay attention when making a purchase decision; pays attention when making a purchase decision)).

4 Results and Discussion

The selection of models based on a combination of three criterion features, reflecting the predominant incentives for deciding to purchase healthy products, made it possible to identify eight models of consumer behavior and describe the predominant criteria for choosing products of the healthy segment (Fig. 3):

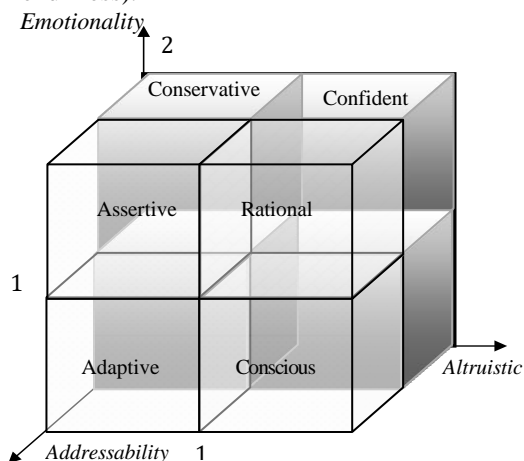
- impulsive – decision-making by consumers is implicit, carried out under the influence of external emotional catalysts at the point of sale (selection criteria: taste, packaging);

- adaptive – decision-making by consumers is carried out not only under the influence of emotional catalysts but also analytically, taking into account knowledge about product ecological labeling (selection criteria: packaging, region of product origin, environmental friendliness);

- conservative – decision-making by consumers is carried out based on established traditions and values, without taking into account existing changes and innovations in the market of products of the healthy segment (selection criteria: price, ease of purchase, trust in the manufacturer);

- conscious – decision-making by consumers is carried out not only about established traditions and values but also taking into account knowledge about ecological labeling (selection criteria: price, region of product origin, environmental friendliness);

- altruistic – the decision is made based on considerations of utility and good for the community or individuals, regardless of personal interests or benefits (selection criteria: taste, trust in the producer);
- confident – the decision to purchase the product is determined by the consumer's own beliefs (selection criteria: taste, price, trust in the manufacturer);
- assertive – decision-making by consumers is carried out not only based on their own beliefs but also based on their knowledge about the products of the healthy segment (selection criteria: taste, price, ease of purchase, region of origin of the product);
- rational – consumer decision-making is made after carefully weighing the available product options, their useful properties, and the specified information in the ecological labeling (selection criteria: taste, price, trust in the manufacturer, region of origin of the product, environmental friendliness).



Behavioral model	Coordinate		
	Addressability	Emotionality	Ecological awareness
Impulsive	[0;1]	[0;1]	[0;1]
Adaptive	[0;1]	[0;1]	(1;2)
Conservative	[0;1]	[1;2]	[0;1]
Assertive	[0;1]	(1;2)	[1;2]
Altruistic	(1;2)	[0;1]	[0;1]
Conscious	[1;2]	(0;1)	(1;2)
Confident	[1;2]	(1;2)	[0;1]
Rational	[1;2]	[1;2]	(1;2)

Fig. 3. Models of consumer behavior in the segment of healthy products

Table 2 summarizes analytical data on trust in various marketing tools by representatives of various models of consumer behavior.

It was determined that web resources are an effective communication tool for all selected models of consumer behavior. For an impulsive model of behavior, information at points of sale, pages in social networks, and information in offline media will be suitable as key influence tools. The adaptive model is characterized by the fact that it is more influenced by the opinions of other people and the feedback of consumers who have already had the experience of using the product for which a decision is made. The tools of influence on the conservative behavior model include mainly information in offline media and the already mentioned websites. The opinion of experts and information on the pages of social networks influences consumers of the assertive model. Consumers of the altruistic model will be

influenced by the opinion of specialists, information from familiar people, and pages of social networks.

Table 2. Determination of configurations of tools of marketing influence for models of consumer behavior in the segment of healthy products

Instrument Model	Information from a specialist (doctor, nutritionist, trainer)	Websites	Information from people you know	Information at points of sale	Online consumer reviews	Pages in social networks	Information in offline media
Impulsive		✓		✓		✓	✓
Adaptive		✓	✓		✓		
Conservative		✓					✓
Assertive	✓	✓				✓	
Altruistic	✓	✓	✓			✓	
Conscious	✓	✓			✓		
Confident		✓				✓	
Rational	✓	✓			✓		✓

The conscious model is characterized by its influence on tools such as information from specialists and online reviews of consumers. A confidential model can be convinced through social networks and a rational model through specialist or online consumer reviews, as well as with the help of offline mass media.

5 Conclusion

The research shows that it is advisable to use a differentiated approach to promote healthy food consumption and lifestyle among the population to convince it to choose and buy healthy food. In the course of a comprehensive study, a selection of eight behavioral consumption models was made. In the next step, the parameters affecting the choice of products and marketing tools most trusted among consumers of individual models were defined [125–151]. It was revealed that web resources are the tool of most trust for all consumer models. Therefore, digital tools should be emphasized in complex plans of action for companies in the health segment.

Acknowledgments

This research was funded by the Ministry of Education and Science of Ukraine “The impact of COVID-19 on the transformation of the medical and social security system: economic, financial and budgetary, institutional and political determinants” (0122U000781); “Socioeconomic recovery after COVID-19: modeling the consequences for macroeconomic stability, national security and community resilience” (0122U000778); and by the European Education and Culture Executive Agency (Jean Monnet Module, project number 101047530 “Healthy economy and policy: European values for Ukraine”).

References

1. N. Letunovska, L. Saher, T. Vasylieva, and S. Lieonov, Paper presented at the E3S Web of Conferences **250**, (2021).

2. M. Soliman, S. Gulvady, O. Lyulyov, T. Pimonenko, *International Journal Hospitality and Tourism Systems*, **16** (1), 58-73. (2023).
3. Ya. Us., T. Pimonenko, O. Lyulyov, Ya. Chen, T. Tambovceva, *Virtual Economics*, **5**(1), 24-41 (2022).
4. V. Smiianov, O. Lyulyov, T. Pimonenko, T. Andrushchenko, S. Sova, N. Grechkovskaya, *Wiadomości Lekarskie*, **LXXIII** (11), 2332-233 (2020).
5. T. Pimonenko, Y. Bilan, J. Horák, L. Starchenko, W. Gajda, *Sustainability*, **12**(4), 1679 (2020)
6. M. Schmitt, *Health Economics and Management Review*, **4**(1), 26-38 (2023).
7. L. Bartkova, and L. Veselovska, *Marketing and Management of Innovations*, **1**, 182-198 (2023).
8. D. Seal, and S. Bag, *Marketing and Management of Innovations*, **3**, 66-77 (2022).
9. F. Guliyev, *Marketing and Management of Innovations*, **2**, 161-170 (2022).
10. O. Chygryn, R. Miskiewicz, *Virtual Economics*, **5**(2), 24-41 (2022).
11. I. Ikonen, F. Sotgiu, A. Aydinli, and P. Verlegh, *Journal of the Academy of Marketing Science* (2019).
12. H. Goodwin, J. Francis, *Journal of Vacation Marketing*, **9**(3), 271–284 (2003).
13. D. Paulauskaite, R. Powell, J. Coca-Stefaniak, and A. Morrison, *International Journal of Tourism Research*, **19**(6), 619–628 (2017).
14. M. Olsen, R. Slotegraaf, and S. Chandukala, *Journal of Marketing*, **78**(5), 119–137 (2014).
15. G. Cachon, and R. Swinney, *Management Science*, **57**(4), 778–795 (2011).
16. Y. Yevdokimov, O. Chygryn, T. Pimonenko, O. Lyulyov, *Innovative Marketing*, **14**(2), 7–15 (2018)
17. T. Pimonenko, O. Lyulyov, Y. Us, *Journal of Tourism and Services*, **12**(23), 169–180 (2021)
18. V. Tkachenko, A.Kuzior, A.Kwilinski, *Journal of Entrepreneurship Education*, **22**(6), 1-10 (2019)
19. A.Kwilinski, H. Dzwigol, V. Dementyev, *International Journal of Entrepreneurship*, **24**(1), 1–5 (2020)
20. A.Kwilinski, N. Dalevska, S. Kravchenko, I. Hroznyi, I. Kovalenko, *Journal of Entrepreneurship Education*, **22**(S11), 1-7 (2019)
21. H. Dzwigol, M. Dźwigoł–Barosz, A.Kwilinski, *International Journal of Entrepreneurship*, **24**(1), 1-5 (2020)
22. A.Kwilinski, I. Slatvitskaya, T. Dugar, L. Khodakivska, B. Derevyanko, *International Journal of Entrepreneurship*, **24**(1 *Special Issue*), 1-8 (2020)
23. A.Kwilinski, V. Litvin, E. Kamchatova, J. Polusmiak, D. Mironova, *International Journal of Entrepreneurship*, **25**(1), 1-8 (2021)
24. M. Trzeciak, T.P. Kopec, A Kwilinski, *Journal of Open Innovation: Technology, Market, and Complexity*, **8**, 58 (2022).
25. H. Dzwigol, *Virtual Economics*, **6**(2), 35–55 (2023)
26. S. Folinias, M.-N. Duquenne, T. Metaxas, *Virtual Economics*, **3**(3), 7–24 (2020)
27. J. García Cabello, *Virtual Economics*, **3**(2), 25–42 (2020)
28. K. Szczepańska-Woszczyzna, S. Gatnar, *Forum Scientiae Oeconomia*, **10**(3), 107–130 (2022)
29. M. Vochozka, J. Horak, T. Krulicky, *Marketing and Management of Innovations*, **2**, 324-339 (2020)
30. L. Mikhnevych, V. Marchenko, P. Hristov, A.Kuzior, *Marketing and Management of Innovations*, **1**, 285-293 (2020)
31. H. Dzwigol, *Marketing and Management of Innovations*, **1**, 128-135 (2020)

32. X. Wei, T. Wang, Y. Chen, O. Lyulyov, T. Pimonenko, *International Journal of Environmental Research and Public Health*, **20**, 2085 (2023).
33. T. Pimonenko, O. Prokopenko, J. Dado, *International Journal of Ecological Economics and Statistics*, **38(4)**, 46–57 (2017)
34. O. Lyulyov, Y. Chortok, T. Pimonenko, O. Borovik, *International Journal of Ecology and Development*, **30(3)**, 1–10 (2015)
35. Y. Us, T. Pimonenko, P. Lyulyov, *Polityka Energetyczna – Energy Policy Journal*, **23(4)**, 49–66 (2021)
36. T. Pimonenko, Y. Us, L. Lyulyova, N. Kotenko, *E3S Web of Conferences*, **234**, 00013 (2021)
37. Y. Us, T. Pimonenko, O. Lyulyov, *Polityka Energetyczna – Energy Policy Journal*, **24(4)**, 5–18 (2021)
38. Y. Us, T. Pimonenko, O. Lyulyov, *Energies*, **16(5)**, 2335 (2023)
39. A.Kwilinski, V. Tkachenko, A.Kuzior, *Journal of Security and Sustainability Issues*, **9(2)**, 561–570 (2019)
40. H. Dzwigol, M. Dzwigol-Barosz, R. Miskiewicz, A.Kwilinski, *Entrepreneurship and Sustainability Issues*, **7(4)**, 2630–2644 (2020)
41. Y. Kharazishvili, A.Kwilinski, O. Grishnova, H. Dzwigol, *Sustainability*, **12(21)**, 8953 (2020)
42. A.Kwilinski, V. Tkachenko, A.Kuzior, *Journal of Security and Sustainability Issues*, **9(2)**, 561–570 (2019)
43. A.Kwilinski, M. Dielini, O. Mazuryk, V. Filippov, V. Kitseliuk, *Journal of Security and Sustainability Issues*, **10(1)**, 345–358 (2020)
44. J. Polcyn, Y. Us, O. Lyulyov, T. Pimonenko, A.Kwilinski, *Energies*, **15**, 108 (2022)
45. Y. Chen, A.Kwilinski, O. Chygryn, O. Lyulyov, T. Pimonenko, *Sustainability*, **13(24)**, 13679 (2021)
46. O. Lyulyov, T. Pimonenko, A.Kwilinski, H. Dzwigol, M. Dzwigol-Barosz, V. Pavlyk, P. Barosz, *Energies*, **14(2)**, 373 (2021)
47. O. Lyulyov, I. Vakulenko, T. Pimonenko, A.Kwilinski, H. Dzwigol, M. Dzwigol-Barosz, *Energies*, **14(12)**, 3497 (2021)
48. O. Arefieva, O. Polous, S. Arefiev, V. Tytykalo, A.Kwilinski, *IOP Conference Series: Earth and Environmental Science*, **628**, 012039 (2021)
49. J. Kotowicz, D. Węcel, A.Kwilinski, M. Brzęczek, *Applied Energy*, **314**, 118933 (2022)
50. O. Lyulyov, H. Shvindina, *Problems and Perspectives in Management*, **15(3)**, 42–52 (2017)
51. A.Kwilinski, R. Volynets, I. Berdnik, M. Holovko, P. Berzin, P. *Journal of Legal, Ethical and Regulatory Issues*, **22(SI2)**, 1–6 (2019)
52. A.Kwilinski, I. Ruzhytskyi, V. Patlachuk, O. Patlachuk, B. Kaminska, *Journal of Legal, Ethical and Regulatory Issues*, **22(SI2)**, 1–6 (2019)
53. A.Kwilinski, A.Kuzior, *Management Systems in Production Engineering*, **28(2)**, 119–123 (2020)
54. A.Kwilinski, Y. Zaloznova, N. Trushkina, N. Rynkevych, *E3S Web of Conferences*, **168**, 00031 (2020)
55. O. Lyulyov, T. Pimonenko, A.Kwilinski, Y. Us, *E3S Web of Conferences*, **250**, 03006 (2021)
56. D. Pudryk, A.Kwilinski, O. Lyulyov, T. Pimonenko, *Forum Scientiae Oeconomia*, **11**, 113–132 (2023)
57. Y. Kharazishvili, A.Kwilinski, *Virtual Economics*, **5(4)**, 7–26 (2022)
58. V. Dementyev, N. Dalevska, A.Kwilinski, *Virtual Economics*, **4(1)**, 54–76 (2021)

59. H. Dzwigol, S. Shcherbak, M. Semikina, O. Vinichenko, V. Vasiuta, *Academy of Strategic Management Journal*, **18(SI1)**, 1-8 (2019)
60. H. Dzwigol, *Academy of Strategic Management Journal*, **19(4)**, 1–8 (2020)
61. H. Dzwigol, M. Dzwigol-Barosz, *Academy of Strategic Management Journal*, **19(5)**, 1–7 (2020)
62. H. Dźwigoł, *Virtual Economics*, **2(1)**, 31–48 (2019)
63. H. Dzwigol, *Virtual Economics*, **5(4)**, 27–49 (2022)
64. H. Dźwigoł, M. Trzeciak, *Forum Scientiae Oeconomia*, **11(1)**, 67–90 (2023)
65. K. Szczepańska-Woszczyna, *Foundations of Management*, **10(1)**, 33–44 (2018)
66. Z. Dacko-Pikiewicz, *Polish Journal of Management Studies*, **19(1)**, 130–144 (2019)
67. I. Podhorska, J. Vrbka, G. Lazaroiu, M. Kovacova, *Marketing and Management of Innovations*, **3**, 276-292 (2020)
68. S.A. Hussain, M.A.U., Haq, Y.A. Soomro, *Marketing and Management of Innovations*, **4**, 144-153 (2020)
69. O. Panchenko, M. Domashenko, O. Lyulyov, N. Dalevska, T. Pimonenko, N. Letunovska, *Management Systems in Production Engineering*, **29(3)**, 235-241 (2021).
70. M. Soliman, O. Lyulyov, H. Shvindina, R. Figueiredo, T. Pimonenko, *European Journal of Tourism Research*, **28**, 2801 (2021).
71. T. Pimonenko, O. Chyryn, O. Lyulyov, A. Goncharova, *Journal of Environmental Management and Tourism*, **9(17)**, 105-113 (2018).
72. A.Kwilinski, O. Lyulyov, T. Pimonenko, H. Dźwigoł, R. Abazov, D. Pudryk, *Sustainability*, **14(11)**, 6413 (2022)
73. A.Kwilinski, O. Lyulyov, H. Dźwigoł, I. Vakulenko, T. Pimonenko, *Energies*, **15(2)**, 545 (2022)
74. B. Moskalenko, O. Lyulyov, T. Pimonenko, A.Kwilinski, H. Dzwigol, *International Journal of Environment and Pollution*, **69(1-2)**, 80–98 (2022)
75. Y. Chen, O. Lyulyov, T. Pimonenko, A.Kwilinski, *Energy and Environment*, **0(0)**, (2023)
76. H. Dzwigol, A.Kwilinski, O. Lyulyov, T. Pimonenko, *Energies*, **16(3)**, 1117 (2023)
77. H. Dzwigol, A.Kwilinski, O. Lyulyov, T. Pimonenko, *Energies*, **16(7)**, 3090 (2023)
78. A.Kwilinski, O. Lyulyov, T. Pimonenko, *Sustainability*, **15**, 11282 (2023)
79. A.Kwilinski, O. Lyulyov, T. Pimonenko, *Energies*, **16(6)**, 2511 (2023)
80. A.Kwilinski, O. Lyulyov, T. Pimonenko, *T. Energies*, **16(5)**, 2372 (2023)
81. A.Kwilinski, O. Lyulyov, T. Pimonenko, *Sustainability*, **15(14)**, 11282 (2023)
82. A.Kwilinski, O. Lyulyov, T. Pimonenko, *Land*, **12(2)**, 511 (2023)
83. Y. Ziabina, A.Kwilinski, O. Lyulyov, T. Pimonenko, Y. Us, *Energies*, **16(2)**, 998 (2023)
84. A.Kuzior, O. Lyulyov, T. Pimonenko, A.Kwilinski, D. Krawczyk, *Sustainability*, **13(15)**, 8145 (2021)
85. O. Lyulyov, O. Chyryn, T. Pimonenko, A.Kwilinski, *Sustainability*, **15(9)**, 7249 (2023)
86. N. Letunovska, A.Kwilinski, H. Dzwigol, O. Lyulyov, T. Pimonenko, *Virtual Economics*, **4(4)**, 33–51 (2021)
87. H. Dzwigol, M. Dzwigol-Barosz, Z. Zhyvko, R. Miskiewicz, H. Pushak, *Journal of Security and Sustainability Issues*, **8(3)**, 307-317 (2019)
88. H. Dźwigoł, *E3S Web of Conferences*, **307**, 01002 (2021)
89. N. Letunovska, R. Abazov, Y. Chen, *Virtual Economics*, **5(4)**, 87–99 (2022)
90. Ł. Wróblewski, Z. Dacko-Pikiewicz, *Sustainability*, **10(11)**, 3856 (2018)
91. W. Sadiq, I. Abdullah, K. Aslam, S. Zulfiqar, *Marketing and Management of Innovations*, **1**, 149-166 (2020)
92. V. Panchenko, Yu. Harust, Ya. Us, O. Korobets, V. Pavlyk, *Marketing and Management of Innovations*, **1**, 256-264 (2020)

93. X. Wei, J. Zhang, O. Lyulyov, T. Pimonenko, *Sustainability*, **15**, 12009 (2023).
94. R. Chen, Y. Chen, O. Lyulyov, T. Pimonenko, *Land*, **12**, 1459 (2023).
95. Z. Wang, S. Lin, Y. Chen, O. Lyulyov, T. Pimonenko, *Sustainability*, **15**, 9020 (2023).
96. H. Su, Y. Lu, O. Lyulyov, T. Pimonenko, *Sustainability*, **15**, 7030 (2023).
97. Z. Dong, L. Wu, Y. Chen, O. Lyulyov, T. Pimonenko, *International Journal of Environmental Research and Public Health*, **19**, 15931 (2022).
98. Y. Chen, F. Ali, O. Lyulyov, T. Pimonenko, *Energy & Environment*, 1-27 (2022).
99. Q. Wang, Y. Chen, H. Guan, O. Lyulyov, T. Pimonenko, *Sustainability*, **14**, 8321 (2022).
100. L. Zhang, Y. Chen, O. Lyulyov, T. Pimonenko, *Sustainability*, **14**, 4361 (2022).
101. Y. Ziabina, T. Pimonenko, O. Lyulyov, Y. Us, D. Proshkin, In *E3S Web of Conferences* **307**, 09002 (2021).
102. T. Tambovceva, I. Ivanov, O. Lyulyov, T. Pimonenko, N. Stoyanets, K. Yanishevskaya, *International Journal of Global Environmental Issues*, **19**(1-3), 158-176 (2020).
103. Y. Bilan, T. Pimonenko, L. Starchenko, *E3S Web of Conferences*, **159** (2020).
104. T. Pimonenko, J. Cebula, O. Chygryn, S. Chayen, *International Journal of Environmental Technology and Management*, **21**(5/6), 421–438 (2018).
105. T. Pimonenko, O. Prokopenko, J. Cebula, S. Chayen, *International Journal of Ecology and Development*, **32**(1), 98-107 (2017).
106. O. Chigrin, T. Pimonenko, *International Journal of Ecology Development*, **29**.3, 1–13 (2014)
107. T. Pimonenko, J. Cebula, *International Journal of Ecology Development*, **30**.2, 20–30 (2015)
108. A.Kwilinski, O. Lyulyov, T. Pimonenko, *Information*, **14**(8), 444 (2023)
109. A.Kwilinski, O. Lyulyov, T. Pimonenko, *Information*, **14**(9), 480 (2023)
110. A.Kwilinski, O. Lyulyov, T. Pimonenko, *Computation*, **11**(10), 199 (2023)
111. A.Kwilinski, *Virtual Economics*, **6**(3), 56–69 (2023)
112. N. Letunovska, F. A. Offei, P. A. Junior, O. Lyulyov, T. Pimonenko, A.Kwilinski, *Logistics*, **7**(3), 47 (2023)
113. A.Kwilinski, L. Hnatyshyn, O. Prokopyshyn, N. Trushkina, *Virtual Economics*, **5**(2), 43–70 (2022)
114. H. Dźwigoł, *Virtual Economics*, **4**(1), 98–117 (2021)
115. A. Zhanibek, R. Abazov, A. Khazbulatov, *Virtual Economics*, **5**(2), 71–94 (2022)
116. W. Drożdż, The development of electromobility in Poland. *Virtual Economics*, **2**(2), 61–69 (2019)
117. X. Gao, W. Huang, H. Wang, *Virtual Economics*, **4**(1), 7–18 (2021)
118. V. Nesterenko, R. Miskiewicz, R. Abazov, *Virtual Economics*, **6**(1), 57–70 (2023)
119. L. Ingber, *Virtual Economics*, **3**(2), 7–24 (2020)
120. H. I. Hussain, M. Haseeb, F. Kamarudin, Z. Dacko-Pikiewicz, K. Szczepańska-Woszczyzna, *Processes*, **9**, 1103 (2021)
121. F. Rahmanov, M. Mursalov, A. Rosokhata, *Marketing and Management of Innovations*, **2**, 243-251 (2021)
122. Y. Chen, S. Xu, O. Lyulyov, T. Pimonenko, *Technological and Economic Development of Economy*, **29**(2), 518–538 (2023).
123. M. Zhang, Y. Chen, O. Lyulyov, T. Pimonenko, *Systems*, **11**, 13 (2023).
124. Q. Chen, Q. Chi, Y. Chen, O. Lyulyov, T. Pimonenko, *International Journal of Environmental Research and Public Health*, **19**(19), 12171 (2022).
125. O. Lyulyov, T. Pimonenko, N. Stoyanets, N. Letunovska, *Research in World Economy*, **10**(4), 97–105 (2019)
126. O. Dubina, Y. Us, T. Pimonenko, O. Lyulyov, *Virtual Economics*, **3**(3), 52–66 (2020)
127. S. Acheampong, T. Pimonenko, O. Lyulyov, *Virtual Economics*, **6**(1), 19–37 (2023)

128. T. Pimonenko, O. Lyulyov, Y. Samusevych, Y. Us, *Financial and Credit Activity: Problems of Theory and Practice*, **2(43)**, 259–270 (2022)
129. O. Lyulyov, B. Moskalenko, *Virtual Economics*, **3(4)**, 131–146 (2020)
130. A.Kwilinski, *Academy of Accounting and Financial Studies Journal*, **23(SI2)**, 1-6 (2019)
131. A.Kwilinski, O. Vyshnevskiy, H. Dzwigol, *Journal of Risk and Financial Management*, **13(7)**, 142 (2020)
132. A.Kwilinski, N. Dalevska, V. V. Demytyev, *Journal of Risk and Financial Management*, **15(3)**, 124 (2022)
133. H. Dzwigol, N. Trushkina, A.Kwilinski, *Virtual Economics*, **4(2)**, 41–75 (2021)
134. A.Kwilinski, *Forum Scientiae Oeconomia*, **11(3)**, 87-107 (2023)
135. M. Pankova, A.Kwilinski, N. Dalevska, V. Khobta, *Virtual Economics*, **6(1)**, 71–91 (2023)
136. H. Dzwigol, *Virtual Economics*, **5(1)**, 78–93 (2022)
137. S. Xu, Y. Chen, O. Lyulyov, T. Pimonenko, *Prague Economic Papers*, **32** (3), 292–319 (2023).
138. Y. Kharazishvili, A.Kwilinski, H. Dzwigol, V. Liashenko, *Virtual Economics*, **4(2)**, 7–40 (2021)
139. H. Dzwigol, *Virtual Economics*, **2(4)**, 46–70 (2019)
140. M. Dzwigol-Barosz, H. Dzwigol, *E3S Web of Conferences*, **307**, 06003 (2021)
141. K. Szczepanska-Woszczyzna, R. Bogaczyk, *Forum Scientiae Oeconomia*, **11(3)**, 9–29 (2023)
142. J. Polcyn, O. Lyulyov, T. Pimonenko, V. Vovk, *Forum Scientiae Oeconomia*, **11(3)**, 53–67 (2023)
143. B. Moskalenko, O. Lyulyov, T. Pimonenko, *Forum Scientiae Oeconomia*, **10(2)**, 153–172 (2022)
144. Z. Dacko-Pikiewicz, *Forum Scientiae Oeconomia*, **7(2)**, 37–51 (2019)
145. R. Sadigov, *Marketing and Management of Innovations*, **1**, 167-175 (2022)
146. A. Kuznyetsova, I. Tiutiunyk, Y. Panimash, Z. Zsolt, P. Zsolt, *Marketing and Management of Innovations*, **3**, 125-138 (2022)
147. A. Sokolovska, T. Zatonatska, A. Stavyt'skyi, O. Lyulyov, V. R. Giedraitis, *Research in world economy*, **11(4)**, 1-15 (2020).
148. Y. Yevdokimov, L. Melnyk, O. Lyulyov, O. Panchenko, V. Kubatko, *Problems and Perspectives in Management*, **16(2)**, 279-290 (2018).
149. L. Wu, X. Wang, H. Kai, Y. Chen, O. Lyulyov, T. Pimonenko, *Economic Research-Ekonomska Istraživanja*, **36(2)**, 2182808 (2023).
150. H. Guan, S. Li, Q. Wang, O. Lyulyov, T. Pimonenko, *Journal of Competitiveness*, **14(4)**, 155–171 (2022).
151. L. Wu, K. Hu, O. Lyulyov, T. Pimonenko, I. Hamid, *Sustainability*, **14**, 14003 (2022).