



# Expert insights into mesolevel industrial ecosystems: pathways for economic transformation

E. S. Mityakov<sup>a</sup>  0000-0001-6579-0988, N. N. Kulikova<sup>b,\*</sup>  0000-0003-3378-5230

<sup>a</sup> MIREA - Russian Technological University, Department of Informatics, Moscow, Russia;

<sup>b</sup> MIREA - Russian Technological University, Department of Innovation Management, Moscow, Russia

## References

- [1] L. Gamidullaeva, N. Shmeleva, T. Tolstykh, and A. Shmatko, "An assessment approach to circular business models within an industrial ecosystem for sustainable territorial development," *Sustainability*, vol. 14, no. 2, p. 704, 2022, doi: 10.3390/su14020704.
- [2] M. Cardoso, E. Ares, L. P. Ferreira, and G. Pelaez, "Using Index Function and Artificial Intelligence to assess Sustainability: A Bibliometric analysis," *International Journal of Industrial Engineering and Management*, vol. 14, no. 4, pp. 311-325, 2023, doi: 10.24867/IJIEEM-2023-4-341.
- [3] D. K. Mikhailidi, A. V. Ragutkin, D. O. Skobelev, and A. B. Sukhaterin, "Organization of an engineering center for industrial import substitution," *Russian Technological Journal*, vol. 11, no. 4, pp. 105-115, 2023, doi: 10.32362/2500-316X-2023-11-4-105-115.
- [4] A. Yehoshua, A. Bechar, Y. Cohen, L. Shmuel, and Y. Edan, "Dynamic Sampling Algorithm for Agriculture Monitoring Ground Robot," *International Journal of Simulation Modelling*, vol. 22, no. 3, pp. 392-403, 2023, doi: 10.2507/IJSIMM22-3-646.
- [5] L. C. Maia, A. C. Alves, and C. P. Le, "Sustainable work environment with lean production in textile and clothing industry," *International Journal of Industrial Engineering and Management*, vol. 4, no. 3, pp. 183-190, 2013, doi: 10.24867/IJIEEM-2013-3-122.
- [6] B. Bajic, N. Suzic, N. Simeunovic, S. Moraca, and A. Rikalovic, "Real-time data analytics edge computing application for industry 4.0: The mahalalanobis-taguchi approach," *Int. J. Ind. Eng. Manag.*, vol. 14, no. 3, pp. 146-156, 2020, doi: 10.24867/IJIEEM-2020-3-260.
- [7] Y. M. Akatkin, O. E. Karpov, V. A. Konyavskiy, and E. D. Yasinovskaya, "Digital economy: Conceptual architecture of a digital economic sector ecosystem," *Business Informatics*, no. 4(42), pp. 17-28, 2017, doi: 10.17323/1998-0663.2017.4.17.28.
- [8] E. V. Popov, V. L. Simonova, and I. P. Chelak, "Assessment of the innovative ecosystems development," *Russian Journal of Innovation Economics*, vol. 10, no. 4, pp. 2359-2374, 2020.
- [9] T. O. Tolstykh and A. M. Agaeva, "Ecosystem model of enterprise development in the context of digitalization," *Models Syst. Netw. Econ. Technol. Nat. Soc.*, vol. 2, pp. 37-49, 2020, doi: 10.21685/2227-8486-2020-1-3.
- [10] B. Baldassarre, M. Schepers, N. Bocken, E. Cuppen, G. Korevaar, and G. Calabretta, "Industrial Symbiosis: towards a design process for eco-industrial clusters by integrating Circular Economy and Industrial Ecology perspectives," *Journal of cleaner production*, vol. 216, pp. 446-460, 2019, doi: 10.1016/j.jclepro.2019.01.091.
- [11] J. L. Walls and R. L. Paquin, "Organizational Perspectives of Industrial Symbiosis: A Review and Synthesis," *Organization & Environment*, vol. 28, no. 1, pp. 32-53, Mar. 2015, doi: 10.1177/1086026615575333.
- [12] M. O. Soldak, "Industrial ecosystems and technological development," *Economy of Industry*, no. 4(88), pp. 75-91, 2019, doi: 10.15407/econindustry2019.04.075.
- [13] J. S. Baldwin, "Industrial ecosystems: an evolutionary classification scheme," *Progress in Industrial Ecology: An International Journal*, vol. 5, no. 4, pp. 277-301, 2008.
- [14] C. Zhang, Y. Zhang, and Y. Wang, "Effect of Investment in Environmental Protection on Green Development of Industrial Enterprises: Evidence from Central China," *Tehnicki Vjesnik*, vol. 30, no. 1, pp. 341-347, 2023, doi: 10.17559/TV-20220520153455.
- [15] L. A. Gamidullaeva, "Industrial cluster of the region as a localized ecosystem: the role of selforganization and collaboration factors," *π-Economy*, vol. 99, no. 1, pp. 62-82, 2023, doi: 10.18721/JE.16105.
- [16] M. I. S. Oliveira, G. D. F. Barros Lima, and B. Farias Lóscio, "Investigations into Data Ecosystems: a systematic mapping study," *Knowl Inf Syst*, vol. 61, no. 2, pp. 589-630, 2019, doi: 10.1007/s10115-018-1323-6.

- [17] I. Krasnyuk, M. Kolgan, and Y. Medvedeva, "Development of an ecosystem approach and organization of logistics infrastructure," *Transportation Research Procedia*, vol. 54, pp. 111-122, 2021, doi: 10.1016/j.trpro.2021.02.054.
- [18] S. Monsef and W. K. W. Ismail, "The impact of open innovation in new product development process," *International Journal of Fundamental Psychology & Social Sciences*, vol. 2, no. 1, pp. 7-12, 2012.
- [19] E. Shkarupeta, T. Kalmykova, and N. Serebryakova, "Cenological approach in industrial ecosystem research in transition to industry 5.0," *E3S Web of Conferences*, vol. 371, p. 03054, 2023, doi: 10.1051/e3sconf/202337103054.
- [20] S. Barnes, *Platform Urbanism: Negotiating Platform Ecosystems in Connected Cities*. Singapore: Springer Singapore, 2020. doi: 10.1007/978-981-32-9725-8.
- [21] X. Q. Zhu, "Collaborative modelling and simulation for manufacturing cost analysis," *International Journal of Simulation Modelling*, vol. 22, no. 2, pp. 338-349, 2023, doi: 10.2507/IJSIMM22-2-CO9.
- [22] B. Lekovic, Z. Vojinovic, and S. Milutinović, "Cooperation as a mediator between entrepreneurial competences and internationalization of new venture," *Engineering Economics*, vol. 31, no. 1, pp. 72-83, 2020, doi: 10.5755/j01.ee.31.1.20743.
- [23] T. O. Tolstykh, N. V. Shmeleva, and A. M. Agaeva, "Methodology for assessing level of maturity of economic security of enterprises in industrial ecosystems," *Region: sistemy, ekonomika, upravlenie*, no. 4(51), pp. 126-143, 2020.
- [24] T. Haaker, P. T. M. Ly, N. Nguyen-Thanh, and H. T. H. Nguyen, "Business model innovation through the application of the Internet-of-Things: A comparative analysis," *Journal of Business Research*, vol. 126, pp. 126-136, 2021, doi: 10.1016/j.jbusres.2020.12.034.
- [25] L. Harala, L. Alkki, L. Aarikka-Stenroos, A. Al-Najjar, and T. Malmqvist, "Industrial ecosystem renewal towards circularity to achieve the benefits of reuse-Learning from circular construction," *Journal of Cleaner Production*, vol. 389, p. 135885, 2023, doi: 10.1016/j.jclepro.2023.135885.
- [26] R. Gatautis, "The rise of the platforms: Business model innovation perspectives," *Engineering Economics*, vol. 28, no. 5, pp. 585-591, 2017, doi: 10.5755/j01.ee.28.5.19579.
- [27] F. A. Boons and L. W. Baas, "Types of industrial ecology: the problem of coordination," *Journal of cleaner production*, vol. 5, no. 1-2, pp. 79-86, 1997, doi: 10.1016/S0959-6526(97)00007-3.
- [28] M. R. Chertow, "INDUSTRIAL SYMBIOSIS: Literature and Taxonomy," *Annu. Rev. Energy. Environ.*, vol. 25, no. 1, pp. 313-337, 2000, doi: 10.1146/annurev.energy.25.1.313.
- [29] M. R. Chertow, W. S. Ashton, and J. C. Espinosa, "Industrial Symbiosis in Puerto Rico: Environmentally Related Agglomeration Economics," *Regional Studies*, vol. 42, no. 10, pp. 1299-1312, 2008, doi: 10.1080/00343400701874123.
- [30] A. S. Molchan, T. O. Tolstykh, and A. Y. Nadaenko, "Principles of ecosystem formation and development and their impact on industrial management strategy," *Economics of stable development*, no. 1(41), pp. 124-128, 2020.
- [31] G. B. Kleiner, "Industrial ecosystems: a look into the future," *Econ. Revival Russ.*, vol. 2, no. 56, pp. 53-62, 2018.
- [32] M. Memon, H. Ting, C. Hwa, T. Ramayah, F. Chuah, and T. H. Cham, "Sample Size for Survey Research: Review and Recommendations," *Journal of Applied Structural Equation Modeling*, vol. 4, no. 2, pp. i-xx. 2020, doi: 10.47263/JASEM.4(2)01.



