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NEURAL NETWORK TECHNOLOGIES FOR MANAGERIAL DECISION-SUPPORT AT INDUSTRIAL ENTERPRISES

The relevance of the study is determined by the increasing complexity of managerial decisions taken by the management of Ukraine's industrial enterprises under conditions of full-scale war, worn-out fixed production assets, a shortage of qualified personnel, and high uncertainty of production situations. Traditional decision-support methods, based on linear models and expert assessments, are increasingly insufficient to account for the multifactorial nonlinear dependencies inherent in modern production, supply and logistics processes. Neural network technologies — an artificial intelligence toolkit capable of revealing such dependencies in large arrays of heterogeneous data — are increasingly applied as the basis for managerial decision-support systems at industrial enterprises. The purpose of the article is to systematise the functional directions of applying neural network technologies for managerial decision-support at industrial enterprises and to substantiate the stages of implementing such systems, taking into account the specifics of Ukrainian machine-building and metallurgical enterprises. The study applies methods of systemic analysis, comparison, generalisation and structural-logical modelling. The theoretical foundations of artificial neural networks — the multilayer perceptron, radial basis function networks, Hopfield networks and recurrent architectures — and their suitability for solving managerial tasks of an industrial enterprise are examined. Five functional directions of applying neural network technologies in an industrial enterprise's management system are systematised: supporting managerial decision-making under uncertainty of production situations; forecasting and optimising supply and logistics activities; ensuring functional stability of production processes through fault diagnosis and localisation; predictive maintenance and quality control at metallurgical and machine-building enterprises; and supporting operational efficiency through integration with digital twins and large language models. Calculated estimates of the economic effect of implementing artificial intelligence at Ukrainian machine-building enterprises are presented using an illustrative model, according to which the return on investment (ROI) ranges from 30.0% to 45.3% (averaging 39.7%), with a forecast productivity increase of 36.7–52.0% within three years; at the same time, according to official State Statistics Service data, the share of Ukrainian enterprises using artificial intelligence technologies remains as low as 5.2–5.4% throughout 2022–2024. Key challenges of implementing neural network technologies in industrial enterprise management are identified: the sector-specific nature of industrial data, the opacity of "black-box" algorithms, insufficient adaptation of models to industrial conditions, a shortage of qualified personnel, and high computational requirements. A sequence of implementation stages is substantiated — from a pilot project within a single

functional area to the formation of a hybrid decision-support system integrated with the enterprise's digital twin. The results can be used by the management of industrial enterprises in developing digital transformation programmes for management systems, as well as by researchers for further studies on the application of artificial intelligence in management.

Keywords: managerial decision-support; neural network technologies; industrial enterprises; artificial intelligence; management systems; digital transformation; predictive maintenance.