REVIEW

of the official reviewer for dissertation work

Rakhmetulina Aigerim Abayevna on the theme «Development of logistics infrastructure and supply chains of agri-food products in the Republic of Kazakhstan» presented for the degree of Doctor of Philosophy (PhD) in the specialty «8D04101 - Economy».

№	Criteria	Eligibility (one of the options must be checked)	Justification of the position of the official reviewer
1.	The topic of the thesis (as of the date of its approval) corresponds to the directions of development of science and/or state programs	1.1 Compliance with priority areas of science development or government programs:	Concept for the Development of the Transport and Logistics Potential of the Republic of Kazakhstan until 2030.
		1) The thesis was completed within the framework of a project or target program financed from the state budget (indicate the name and number of the project or program) 2) The thesis was completed within the framework of another state program (indicate the name of the program) 3) The dissertation corresponds to the priority direction of the development of science, approved by the Higher Scientific and Technical Commission under the Government of the Republic of Kazakhstan (indicate the direction)	1) The project within the framework of grant funding from the Ministry of Higher Education of the Republic of Kazakhstan "AP19677634 Development of logistics infrastructure and sustainable supply chains of perishable food products in Kazakhstan (2023 - 2025) 2) Concept for the Development of the Transport and Logistics Potential of the Republic of Kazakhstan until 2030.
2.	Importance for science	The work makes/does not make a significant contribution to science, and its importance is well disclosed/not disclosed	The work makes a significant contribution to science, particularly in the field of economic analysis of logistics infrastructure and agri-food supply chains.
3.	The principle of independence	Self-reliance level: 1) High; 2) Medium; 3) Low; 4) No independence	Medium
4.	The principle of inner unity	4.1 Justification of the relevance of the thesis: 1) Justified;	The relevance of the dissertation is well substantiated in the introduction. The author convincingly argues for the

		2) Partially justified; 3) Not justified.	importance of developing logistics infrastructure and agri-food supply chains in Kazakhstan. The key justifications include: - The contribution of the agri-food sector to GDP and its export potential. - High logistics costs and significant product losses due to inefficient supply chain management (35–40% of harvested products are lost due to the lack of modern storage facilities). - Government programs supporting logistics, requiring scientific justification and economic analysis. - Systemic issues in logistics (insufficient storage capacity, outdated transport infrastructure, and lack of coordination among supply chain participants). The study is highly relevant as it addresses economic inefficiencies, logistics challenges, and government policy implications.
		4.2 The content of the thesis reflects the topic of the thesis: 1) Reflects; 2) Partially reflects; 3) Does not reflect	The dissertation topic is interdisciplinary, combining Economics and Logistics to address the development of logistics infrastructure and agri-food supply chains. The research integrates economic theories, financial models, and investment strategies with logistics optimization, supply chain management, and digital transformation of distribution systems. The study evaluates investment efficiency, logistics cost structures, public-private partnership mechanisms, and the impact of supply chains on economic growth. The dissertation focuses on optimizing distribution networks, cold chain logistics, infrastructure development, and the role of wholesale distribution centers (WDCs) in reducing product losses. Alignment of Chapters with the Topic: Chapter 1 – Theoretical and methodological foundations of logistics infrastructure and economic principles affecting supply chains (provides the interdisciplinary scientific basis).

			Chapter 2 – Analysis of the current state of logistics and agri-food supply chains, including economic inefficiencies, logistics barriers, and infrastructure gaps (examines real-world challenges). Chapter 3 – Priorities and organizational-economic mechanisms for logistics development, including investment models, public-private partnerships, and digitalization strategies (proposes integrated economic and logistical solutions). Each chapter logically supports the central interdisciplinary research hypothesis: the development of logistics infrastructure requires an economic and logistical approach to enhance the efficiency, profitability, and sustainability of the agri-food sector.
		4.3. The purpose and objectives correspond to the topic of the thesis: 1) correspond; 2) partially correspond; 3) do not correspond	The dissertation clearly defines its purpose and objectives, which are directly related to the research theme. Research Purpose: To develop recommendations and an organizational-economic mechanism for improving logistics infrastructure in agri-food supply chains. Key Research Objectives: - Theoretical analysis of logistics infrastructure and its role in agri-food supply chains. - Study of international experience and development of methodological approaches. - Evaluation of the current logistics infrastructure in Kazakhstan. - Development of recommendations for infrastructure improvements and supply chain optimization. - Designing a model for Wholesale Distribution Centers (WDCs). - Assessing the economic efficiency of proposed solutions. Each objective is logically linked to the overall research goal, ensuring a structured and systematic approach. The objectives are well-defined, logically arranged, and fully aligned with the research topic.

		4.4 All sections and provisions of the thesis are logically interconnected: 1) completely interconnected; 2) the interconnection is partial; 3) there is no interconnection	The dissertation follows a well-structured logical framework, ensuring that all chapters and sections are interdependent. Key Logical Connections in the Thesis: Chapter 1 establishes the theoretical foundations of logistics infrastructure, which are later applied in Chapter 2's empirical analysis. Section 2.2 analyzes the current functionality of Wholesale Distribution Centers (WDCs), and Section 3.2 builds on this by proposing an optimized WDC model. Section 2.3 identifies key factors influencing logistics development, which are then addressed through strategic policy recommendations in Section 3.1. The dissertation follows a clear and interconnected structure, where each chapter builds logically on the previous ones.
		4.5 The new solutions (principles, methods) proposed by the author are reasoned and evaluated in comparison with the known solutions: 1) there is a critical analysis; 2) partial analysis; 3) the analysis does not represent one's own opinions, but quotes from other authors	The author introduces new organizational and economic mechanisms for logistics development, all of which are well-argued and supported by empirical evidence. Key Innovations Proposed: - An optimized WDC model, incorporating geographical location analysis, selection criteria, and inventory management systems. - Optimization of supply chain routes through gravity center models and logistics cost calculations. - Economic feasibility assessment of WDCs, using NPV, IRR, and DPP to demonstrate project profitability. The proposed solutions are well-justified, backed by empirical data, and critically compared with existing models.
5.	Scientific novelty principle	5.1 Are the scientific results and provisions new? 1) completely new; 2) partially new (25-75% are new); 3) not new (less than 25% are new)	Partially New (25-75% are new) The dissertation presents a combination of theoretical advancements, empirical research, and applied models, many of which offer new insights or adaptations to existing methodologies in the field of logistics and agri-food supply chains. The originality of the study is seen in

			several key areas: - Refinement of logistics infrastructure concepts: The study systematically clarifies the structure and elements of logistics infrastructure, contributing to its theoretical foundation. - Development of an integrated model for logistics infrastructure optimization: The dissertation proposes an original classification and a structured approach for the placement and operation of wholesale distribution centers (WDCs) based on empirical data. - Introduction of new methodological tools for logistics assessment: The study incorporates factor analysis, center-of-gravity models, and multi-criteria evaluation techniques to assess logistics efficiency, which enhances the scientific rigor of the study. - Empirical validation of supply chain inefficiencies: The research identifies gaps in the logistics infrastructure in Kazakhstan and proposes strategies to minimize economic losses associated with product distribution inefficiencies. While some of the theoretical foundations build on previous research, the methodological framework and empirical findings contribute significantly to the field.
		5.2 Are the dissertation findings new? 1) completely new; 2) partially new (25-75% are new); 3) not new (less than 25% are new)	Partially New (25-75% are new) The dissertation presents a mix of adapted methodologies and original insights, with the following notable contributions: 1. A comprehensive assessment of logistics infrastructure gaps in Kazakhstan: - Identifies key logistical constraints in the agri-food sector (e.g., lack of cold storage facilities, high transport costs, and inefficient supply chain coordination). - Establishes a regional logistics ranking methodology to determine the most effective locations for WDCs and distribution networks. 2. Development of a new organizational and economic model for WDCs:

			- The study modifies existing logistics models to adapt them to the specific conditions of Kazakhstan's economy and geography. - A three-tiered logistics model (storage-distribution-trade) is proposed to enhance supply chain sustainability and reduce waste. 3. Empirical testing of economic efficiency metrics: - The dissertation applies NPV (Net Present Value), IRR (Internal Rate of Return), and DPP (Discounted Payback Period) calculations to demonstrate the financial viability of proposed logistics solutions. - These indicators confirm the economic feasibility of public-private partnerships (PPP) in logistics infrastructure development. 4. Practical implementation of findings: - Some of the proposed models and recommendations have already been tested in real projects, as reflected in Implementation Acts. - The study was used in a grant-funded research project by the Ministry of Higher Education of Kazakhstan. The dissertation makes a strong empirical and practical contribution by validating its theoretical models with real-world applications.
		5.3 Technical, technological, economic or management decisions are new and reasonable: 1) completely new; 2) partially new (25-75% are new); 3) not new (less than 25% are new)	Partially New (25-75% are new) The study integrates economic modeling, logistics management, and technological innovations, offering partially new policy solutions. Key Contributions: 1. Economic Policy & Investment Strategies - The study proposes a financial model for logistics infrastructure development, including tax incentives, PPP frameworks, and subsidy allocation to support WDC construction. - Recommends regional investment strategies to enhance market accessibility and trade efficiency. 2. Logistics Management Innovations

			- Development of a hierarchical logistics framework (national, regional, and local levels) that improves supply chain coordination and cost efficiency. - Proposes a data-driven decision-making system for real-time inventory management and logistics flow optimization. 3. Technological Advancements in Logistics - Development of a cold chain logistics model to reduce perishable product loss by optimizing temperature-controlled transport and storage. The proposed economic and technological solutions offer a novel integration of digital and economic approaches, making a substantial contribution to logistics infrastructure development.
6.	The validity of the main findings	All main conclusions are/are not based on scientifically significant evidence or well-grounded (for qualitative research and areas of training in the arts and humanities)	All main conclusions are based on scientifically significant evidence and are well-grounded.
7.	The main provisions for the defense	It is necessary to answer the following questions for each provision separately: 7.1 Is the provition proven? 1) proven; 2) rather proven; 3) rather not proven; 4) not proven 7.2 Is it trivial? 1) yes; 2) no 7.3 Is it new? 1) yes; 2) no 7.4 Application level: 1) narrow; 2) medium;	• 7.1 Proven: **Yes** • 7.2. Not trivial: **Yes** • 7.3. New: **Yes** • 7.4. Application level: **Wide** • 7.5. Proven in the articles: **Yes**

		3) wide 7.5 Is it proven in the article? 1) yes; 2) no	
8.	The principle of reliability Reliability of sources and information provided	8.1 Choice of methodology - is justified or the methodology is described in sufficient detail 1) yes; 2) no	The dissertation employs a comprehensive and well-justified methodology, incorporating both qualitative and quantitative research approaches. The author systematically explains the rationale behind the selection of methods for assessing logistics infrastructure and supply chains in Kazakhstan. Key Methodological Approaches Used: - Comparative analysis of international logistics models to adapt best practices to Kazakhstan's economic conditions. - Factor analysis and center-of-gravity models to determine optimal locations for Wholesale Distribution Centers (WDCs). Economic and mathematical modeling, including: - Regression analysis to measure the impact of logistics infrastructure on economic efficiency. - Cluster analysis to classify logistics hubs and their effectiveness. Discounted cash flow (DCF) models to evaluate the financial feasibility of logistics projects. - Multi-criteria decision-making (MCDM) methods to rank regional logistics performance. - Survey-based empirical research, incorporating questionnaires and expert interviews to validate assumptions. The choice of methodology is well-substantiated, aligning with best practices in logistics and economic research.
		8.2 The results of the thesis were obtained using modern methods of scientific research and methods of processing and interpreting data using computer technologies:	Yes The research integrates state-of-the-art analytical tools and contemporary economic methodologies.

		1) yes; 2) no	
		8.3 Theoretical conclusions, models, identified relationships and patterns have been proven and confirmed by experimental research (for areas of training in pedagogical sciences, the results have been proven on the basis of a pedagogical experiment): 1) yes; 2) no	The dissertation develops new models for logistics infrastructure and tests them empirically. Key Proven Models and Relationships: - Optimized WDC Model: The study presents a three-tiered logistics model (storage-distribution-trade) and verifies its economic feasibility. - Logistics Efficiency Index: A ranking model for Kazakhstan's regions is developed and validated against economic indicators. - Economic Impact of Logistics Investments: The study quantifies how logistics modernization influences GDP growth and cost reductions. - Cold Chain Logistics Optimization: The research introduces a new methodology for perishable goods management, tested using real supply chain data. The dissertation provides theoretical advancements that are empirically validated, confirming their practical applicability.
		8.4 Important statements are confirmed / partially confirmed / not confirmed by references to current and reliable scientific literature	The dissertation demonstrates strong academic credibility by referencing high-impact journals, international research reports, and government policies. Sources of Supporting Evidence: - Academic Sources: The dissertation cites over 100 sources, including Scopus and Web of Science-indexed publications on logistics, supply chains, and infrastructure economics. - Government Reports: Official documents from Kazakhstan's Ministry of Trade and Integration, the Bureau of National Statistics, and transport development programs validate policy-related conclusions. - International Best Practices: The study incorporates

			international logistics strategies, ensuring a global benchmarking perspective.
		8.5 Used literature sources are sufficient/not sufficient for a literature review	The research demonstrates a comprehensive review of existing knowledge, ensuring that its conclusions are grounded in established theory and empirical data. Key Aspects of the Literature Review: - Covers multiple disciplines: The dissertation references economics, logistics, supply chain management, and digitalization research. - Includes historical and contemporary sources: A balance of foundational logistics theories and cutting-edge studies on AI-driven supply chains and blockchain logistics is evident. - Incorporates local and international research: The dissertation combines Kazakhstani studies with global research, ensuring relevance to regional and international logistics markets.
9	Practical value principle	9.1 The thesis has theoretical value: 1) yes; 2) no	The dissertation provides substantial theoretical contributions in the fields of logistics infrastructure, supply chain management, and economic efficiency analysis. The study: - Develops a structural framework for logistics infrastructure development in the agri-food sector, refining definitions and classification models. - Integrates economic and logistics theories to create an interdisciplinary approach for evaluating logistics efficiency in Kazakhstan. - Introduces a multi-level logistics model (storage-distribution-trade) for improving agri-food supply chains. - Expands existing methodological approaches by incorporating factor analysis, cluster analysis, and regression models for logistics performance evaluation. - Proposes new decision-making frameworks for regional logistics investment and development strategies. The dissertation advances logistics and economic

			theory by creating new models and assessment methodologies.
		9.2 The thesis is of practical importance and there is a high probability of applying the results obtained in practice: 1) yes; 2) no	The study presents practically applicable solutions that can be implemented in government policy, logistics enterprises, and supply chain management. Key Practical Applications: ✓ Wholesale Distribution Center (WDC) Model: - A real-world logistics model for optimizing agri-food supply chains in Kazakhstan. - Determines optimal WDC locations using economic, geographic, and infrastructural factors. - Tested in real projects, confirmed by implementation acts. ✓ Cold Chain Logistics Optimization: - Strategies for reducing product losses (currently 35-40%) in agri-food supply chains. - Proposals for public-private partnerships (PPP) to invest in cold storage logistics. ✓ Economic Feasibility Study: - Net Present Value (NPV), Internal Rate of Return (IRR), and Discounted Payback Period (DPP) models applied to assess logistics infrastructure projects. - Demonstrates cost savings and efficiency improvements from proposed logistics models. ✓ Government and Policy Recommendations: - Research findings are incorporated into the Ministry of Education's grant-funded project on logistics infrastructure. - Provides strategic recommendations for improving Kazakhstan's logistics competitiveness. The research findings have a high probability of implementation in Kazakhstan's logistics sector, government infrastructure projects, and business investments.
		9.3 Are the practice suggestions new? 1) completely new;	Partially New (25-75% are new) The dissertation builds upon existing logistics models but

		2) partially new (25-75% are new); 3) not new (less than 25% are new)	introduces new elements tailored to Kazakhstan's regional economic conditions. The study modifies European and Chinese logistics models for application in Kazakhstan and Benchmarking against logistics systems in France, Spain, and China. The dissertation develops a new ranking methodology to evaluate logistics infrastructure efficiency in different regions of Kazakhstan and uses multi-criteria decision-making (MCDM) and GIS-based spatial analysis. While some elements build on existing global best practices, the adaptation to Kazakhstan's economic and logistical conditions is novel, making the research partially new (25-75%).
10.	The quality of writing and design	Academic writing quality: 1) high; 2) average; 3) below average; 4) low.	high
11.	Notes on a thesis		The dissertation successfully integrates economic theories and logistical frameworks to develop a comprehensive model for logistics infrastructure and agri-food supply chains in Kazakhstan. The dissertation bridges the gap between economic development and logistics infrastructure, demonstrating how supply chain optimization contributes to national economic growth. While the study effectively applies economic modeling and logistics analytics, further quantitative validation and comparative economic benchmarking could enhance its conclusions. Potential Areas for Improvement: ✓ Expansion of Quantitative Models: - More robust econometric modeling (e.g., multi-factor regression analysis) to assess the impact of logistics efficiency on GDP growth. - Simulation models for logistics risk assessment,

			particularly in cold chain management. ✓ International Comparative Analysis: - While the dissertation references European logistics hubs (France, Spain, China), a more detailed cross-country benchmarking could provide deeper insights. - Comparative economic efficiency analysis of Kazakhstan's logistics sector vs. EEU (Eurasian Economic Union) member states. - Best practices from leading global agri-food logistics markets (e.g., Netherlands, Germany) could be quantitatively compared. Adding stronger econometric models and more comparative data would enhance the depth of the study, making its conclusions more universally applicable.
12.	Scientific level of the doctoral student's articles on the topic of research		The articles are of a high scientific level, with publication in reputable journals.
13.	Decision of the official reviewer (pursuant to paragraph 28 of the present Model Regulations)		To award the degree of Doctor of Philosophy (PhD).

The solution: to award the degree of Doctor of Philosophy (PhD) or Doctor of Specialization;

Official Reviewer:

PhD, ass.prof. of "Economics" Department,
HSEB, al-Farabi KazNU

(place of work, academic title)

(signature)

Saltanat Kondybayeva

(FULL NAME)