

REVIEW
of the official reviewer on the dissertation of
Olzhebayeva Gulbakhyt Serikovna entitled “Mechanisms of human capital capacity management of higher education system of Kazakhstan in the context of green transition”, for the degree of Doctor of Philosophy (PhD) in the educational program 8D04101 – “Management”

No	Criteria	Compliance with criteria (one of the answer options should be marked)	Justification of official reviewer’s position (comments in italics)
1.	The topic of the dissertation (as of the date of its approval) corresponds to the directions of scientific development and/or state programs	1.1. Compliance with priority directions of science development or state programs: <u>1) The dissertation was carried out within the framework of a project or targeted program financed from the state budget (specify the name and number of the project or program)</u> 2) The dissertation was carried out within the framework of another state program (specify the name of the program); 3) The dissertation corresponds to the priority direction of science development approved by the Higher Scientific and Technical Commission under the Government of the Republic of Kazakhstan (specify the direction	The topic of the dissertation is aligned with the priority areas of scientific development and state programmes. In particular, the dissertation research is related to the implementation of the following state programme documents: - the Address of the President of the Republic of Kazakhstan, K.-J. Tokayev, dated September 8, 2025, “Kazakhstan in the Era of Artificial Intelligence: Current Challenges and Their Solutions through Digital Transformation”, in which human capital development is identified as one of the key factors in ensuring the country’s competitiveness; - the Concept of Development of Higher Education and Science of the Republic of Kazakhstan for 2023–2029, which provides for the modernisation of the higher education system, the development of human resources, and the improvement of the quality of specialist training; - the Concept for the Transition of the Republic of Kazakhstan to a “green economy”, which defines priorities for the formation of human capital required for sustainable development; - the Strategy for Achieving Carbon Neutrality of the Republic of Kazakhstan until 2060, which provides for human capital development and the training of specialists for a low-carbon economy. Overall, the selected topic has an interdisciplinary and strategic focus, combining issues of human capital management, higher education development, and the preparation of Kazakhstan’s education system for the requirements of the green transformation of the economy.
2.	Importance for science	The work <u>does</u> /does not make a significant contribution to science, and its importance <u>is well -</u>	The dissertation research is significant for the advancement of scientific knowledge in the field of human capital management in the higher education system in the context of the green transformation of the economy. The value of

		<u>disclosed</u> /not disclosed	the dissertation lies primarily in the fact that the issue of human capital development is considered not in isolation, but in relation to institutional changes in higher education, sustainable development requirements, and the formation of new professional and interdisciplinary competencies. Of scientific interest is the adaptation of modern approaches to human capital management to the specific features of Kazakhstan's higher education system. The research provides a deeper understanding of the role of universities not only as educational organisations but also as institutions that develop the human and intellectual capacity required for the transition to a more sustainable model of economic development. The significance of the results is further strengthened by the empirical base and the use of several complementary research methods, which allow the problem under study to be examined from different analytical perspectives. On this basis, the doctoral candidate substantiates directions for improving human capital management and proposes solutions addressing the current development needs of higher education organisations. Overall, the dissertation significantly contributes to the scientific understanding of human capital development mechanisms amid structural changes in the higher education system and is relevant for further research in the fields of higher education management, human resource management, and sustainable development.
3:	Principle of autonomy	Level of autonomy: 1) high; 2) medium; 3) low; 4) no independence.	The doctoral candidate demonstrated a high level of autonomy in conducting the dissertation research. In particular, this autonomy is reflected in the consistent development of the research concept, the definition of the research logic, the interpretation of the results obtained, and the formulation of independent scientific conclusions. The doctoral candidate's ability to independently compare different scientific approaches, identify existing theoretical and practical limitations, and, on this basis, formulate an independent position on human capital management in the higher education system should be noted. The conclusions and proposals presented in the dissertation are not limited to a generalisation of existing provisions but are the result of the doctoral candidate's independent analytical work. The doctoral candidate's contribution is also evident in the transition from the results of theoretical and empirical analysis to the development of specific proposals for improving human capital management mechanisms in the context of the green transition. Overall, the scientific nature of the research, the substantiation of the results obtained, and the

			recommendations formulated allow the doctoral candidate's level of research autonomy to be assessed as high.
4.	Principle of internal unity	4.1 Justification of the relevance of the thesis: <u>1) justified;</u> 2) partially justified; 3) not substantiated.	The relevance of the dissertation research is determined by the changing role of the higher education system in the transition to a sustainable model of economic development. Modern universities should not only provide training for qualified specialists but also develop competencies required for the technological, environmental, and institutional transformation of the economy. The green transition introduces new requirements for professional training, the research activities of academic staff, interdisciplinary competencies, and the ability of universities to adapt to changing socio-economic conditions. In this regard, the doctoral candidate examines in detail how environmental, technological, and institutional changes create new requirements for human capital and necessitate the transformation of existing management mechanisms in universities. The research contributes to a deeper understanding of the role of higher education in developing environmental, digital, and interdisciplinary competencies required for sustainable economic development. For Kazakhstan, this issue is particularly significant in the context of implementing the strategic objectives of sustainable development and the modernisation of higher education. At the same time, the comprehensive management of universities' human capital, taking into account the requirements of green transformation, requires further scientific consideration and the development of appropriate management mechanisms. In this regard, the choice of the dissertation topic is timely and scientifically substantiated.
		4.2: The content of the dissertation reflects the dissertation topic: <u>1) correspond to;</u> 2) partially correspond; 3) do not correspond	The content of the dissertation fully addresses the stated research topic. The theoretical, methodological, and empirical issues considered are directly related to human capital management in Kazakhstan's higher education system in the context of the green transition. The mechanisms and managerial solutions presented by the doctoral candidate are logically related to the subject and objectives of the research. The structure and content of the dissertation consistently address the research problem and maintain the coherence of the chosen scientific direction.
		4.3. The purpose and objectives correspond to the topic of the dissertation:	The aim and objectives of the dissertation are consistent with the stated topic and the research logic. The objectives consistently contribute to achieving the research aim, covering the theoretical and methodological substantiation of the

		<u>1) correspond to;</u> 2) partially correspond; 3) do not correspond	problem, empirical analysis, and the development of human capital management mechanisms in the higher education system in the context of the green transition. The aim and objectives are interrelated, consistently addressed throughout the structure of the dissertation, and correspond to the subject area of the dissertation research.
		4.4 All sections and statements of the dissertation are logically interrelated: <u>1) fully interrelated;</u> 2) partially interrelated; 3) do not interrelated	All sections and provisions of the dissertation form a unified conceptual system and are aimed at addressing the stated scientific problem. There is consistency between the subject of the research, the methodological approaches used, the results obtained, and the conclusions formulated. The theoretical provisions presented by the doctoral candidate are developed in the empirical part of the dissertation and are reflected in the proposed human capital management mechanisms. The conclusions correspond to the results of the research and are interrelated with the provisions submitted for defense.
		4.5 The new solutions (principles, methods) proposed by the author are substantiated and evaluated in comparison with known solutions: <u>1) there is critical analysis</u> 2) the analysis is partial; 3) the analysis does not represent personal opinions, but rather quotes from other authors; 4) no analysis	The solutions proposed in the dissertation are based on an analysis of existing scientific approaches to human capital management and the development of the higher education system. The doctoral candidate does not limit the analysis to describing existing concepts but compares them, identifies their strengths and limitations, and assesses the possibility of applying these approaches in the context of Kazakhstan. The analysis showed that existing approaches mainly consider individual aspects of human capital development — professional competencies, employee motivation, scientific productivity, etc. At the same time, the green transition requires a more integrated approach that simultaneously considers educational, managerial, digital, environmental, and institutional factors. Thus, the new solutions presented in the dissertation do not repeat existing approaches but are developed on the basis of their critical analysis, comparison, and adaptation to the current conditions of higher education development and the requirements of the green transition.
5.	Principle of scientific novelty	5.1 Are the scientific results and provisions new? <u>1) completely new;</u> 2) partially new (25-75% are new); 3) not new (less than 25% are new).	The scientific results of the dissertation are independent in nature and contain elements of scientific novelty related to the development of approaches to human capital management in the higher education system in the context of the green transition. First of all, the doctoral candidate clarified the content of the concept of green-oriented human capital in universities. Unlike the traditional understanding of human capital, the emphasis is placed not only on knowledge and professional skills but also on environmental values, interdisciplinary and

		digital competencies required for sustainable development. The novelty of the research is also reflected in the proposed approach to assessing and managing the human capital of universities. The doctoral candidate combines statistical and sociological data, analysis of scientific productivity and institutional conditions, which allows human capital development to be considered more comprehensively. The practice-oriented component of scientific novelty consists of the developed human capital management mechanisms and a roadmap for their implementation. The proposed solutions take into account the institutional features of Kazakhstan's higher education system and combine the development of green, digital, and interdisciplinary competencies with human capital management mechanisms in the context of the green transition. Taken together, the results obtained allow the scientific provisions of the dissertation to be assessed as completely new in the context of the research problem.
	5.2 Are conclusions of the dissertation new? <u>1) completely new;</u> 2) partially new (25-75% are new); 3) not new (less than 25% are new)	The conclusions of the dissertation are new and are directly based on the scientific results obtained by the doctoral candidate. The novelty of the scientific results lies in the development of theoretical approaches to human capital management in the higher education system, the systematisation of higher education management models in the context of the green transition, as well as the identification of factors affecting the scientific productivity of academic staff and the effectiveness of incentive mechanisms. An important result is the substantiation of multilevel interaction among participants in the human capital development process and the conceptual foundations for the modernisation of the higher education system. The conclusions obtained expand existing views on human capital management in the context of the green transition and take into account the specific features of Kazakhstan's higher education system. Taken together, the conclusions can be assessed as completely new.
	5.3 Technical, technological, economic or management decisions are new and justified: 1) completely new; <u>2) partially new (25-75% are new);</u> 3) not new (less than 25% are new)	The managerial solutions proposed in the dissertation can be assessed as partially new. Some of the approaches and areas of human capital management used are already known in contemporary higher education management practice. At the same time, the doctoral candidate proposes their integrated combination and adaptation to the conditions of Kazakhstan's higher education system, taking into account the objectives of the green transition. The novelty lies in combining institutional, educational, managerial, infrastructural, digital, and social mechanisms within an integrated approach to the development of universities'

			human capital. The developed roadmap provides additional practical value by defining the sequence for implementing the proposed measures and developing environmental, digital, and interdisciplinary competencies. Thus, the proposed solutions develop and specify existing approaches in relation to the current conditions of higher education organisations in Kazakhstan and can be assessed as partially new and sufficiently substantiated.
6.	Validity of the main conclusions	All key findings are <u>based</u> /not based on sound scientific evidence or are reasonably well substantiated (for qualitative research and arts and humanities majors)	The conclusions of the dissertation are directly based on the results of the analysis conducted. To substantiate them, the doctoral candidate used official statistical data, the results of a survey of teaching staff, and expert interviews, which were analysed using quantitative and qualitative research methods. The study applies a set of complementary methods, including statistical, bibliometric, and correlation analysis, a sociological survey, and expert interviews. The combination of quantitative and qualitative methods made it possible to examine the research problem from different perspectives and strengthen the validity of the conclusions obtained. The empirical base includes official statistical data, performance indicators of higher education organisations, bibliometric data, as well as the results of a sociological survey and expert interviews. The theoretical provisions are supported by contemporary domestic and international scientific literature and are considered taking into account the specific features of Kazakhstan's higher education system. The consistent application of complementary methods enhances the objectivity and reliability of the results obtained. Overall, the dissertation is characterised by a high level of scientific validity and convincing conclusions.
7.	The main provisions submitted for defense	The following questions must be answered for each position separately: 7.1 Has the position been proven? 1) proven; 2) most likely proven; 3) most likely not proven; 4) not proven;	Proposition 1. The dissertation proposes an interpretation of the concept of "green-oriented human capital in universities" as a combination of knowledge, professional skills, interdisciplinary competencies, environmental values, and responsible behaviour patterns of members of the university community. Unlike traditional interpretations of human capital, the proposed approach takes into account the importance of environmental values, responsible behaviour, and interdisciplinary competencies for the transition to a sustainable and low-carbon economy. The proposed interpretation expands the theoretical foundations of human capital research in relation to the context of the green transition and the higher education system.

	5) in its current formulation, it is impossible to verify the provenness of the position. 7.2 Is it trivial? 1) yes; <u>2) no;</u> 3) In the current formulation, it is impossible to verify the triviality of the position. 7.3 Is it new? <u>1) yes;</u> 2) no; 3) In the current formulation, it is impossible to verify the triviality of the position. 7.4 Level of application: 1) narrow; 2) medium; <u>3) wide;</u> 4) in its current wording, it is impossible to verify the level of application of the provision 7.5 Is it proven in the article? <u>1) yes;</u> 2) no; 3) In the current formulation, it is impossible to verify the triviality of the position.	Proposition 2. The dissertation systematises management models of the higher education system in the context of the green transition, taking into account differences in the institutional environment, the degree of centralisation of management, and mechanisms for integrating the principles of sustainable development. The systematisation made it possible to compare international approaches to higher education management and identify their characteristic features. The results obtained were used to identify management practices that can be adapted to the conditions of Kazakhstan's higher education system. Proposition 3. The doctoral candidate proposes a combined methodology for assessing the factors of scientific productivity and the effectiveness of human capital management in universities. The proposed methodology provides for the integrated use of official statistical data and the results of a sociological survey, followed by statistical analysis, including the assessment of correlations. The integrated use of data provides a more comprehensive assessment of the factors determining scientific productivity and the effectiveness of human capital management. Proposition 4. The dissertation develops a set of human capital management mechanisms for the higher education system in the context of the green transition. The proposed approach integrates institutional, educational, managerial, infrastructural, digital, and social mechanisms into a unified system. Their integrated application is aimed at developing the human capital of universities and integrating the principles of sustainable development into educational, scientific, and managerial activities. Proposition 5. The proposed roadmap is practice-oriented and establishes the sequence of measures for the development of universities' human capital. Its advantage lies in linking environmental, digital, and interdisciplinary competencies with areas of organisational change. At the same time, the practical effectiveness of the roadmap will further depend on specifying the timeframes, responsible participants, and measurable implementation indicators.
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8.	Principle of reliability. Reliability of sources and information provided	8.1 The choice of methodology - is justified or the methodology is described in sufficient detail: <u>1) yes;</u> 2) no	The methodological framework of the dissertation is well-founded, consistent, and detailed. The doctoral candidate applies a comprehensive approach combining quantitative and qualitative types of analysis. The chosen methodology fully corresponds to the aim and objectives of the research and allows for a comprehensive assessment of the state of human capital in the higher education system, the factors of its development, and the specific features of its management in the context of the green transition.
		8.2 The results of the dissertation were obtained using modern scientific research methods and data processing and interpretation techniques using computer technologies: <u>1) yes;</u> 2) no	The dissertation employs quantitative and qualitative methods. The doctoral candidate conducted bibliometric analysis and a systematic literature review in accordance with the PRISMA 2020 recommendations, and applied methods of descriptive statistics and correlation analysis, a sociological survey, and expert interviews. Specialised software tools, including VOSviewer, SPSS, R, and NVivo, were used to analyse and interpret the data obtained. The selected methodological tools ensure the reliability of the obtained results.
		8.3 The 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): <u>1) yes</u> 2) no	The theoretical provisions and models of the dissertation are supported by empirical data from official statistics, the results of a sociological survey of teaching staff, and expert interviews. The combination of different data sources made it possible to compare the theoretical provisions with the actual state of human capital in Kazakhstan's higher education system and to identify stable relationships among academic performance, professional development, institutional support, and incentive mechanisms. The quantitative results are supplemented by expert assessments of the institutional and managerial factors of green transformation. The identified patterns and relationships served as the basis for substantiating the developed models and human capital management mechanisms, confirming the reliability of the conclusions formulated.
		8.4 Important claims are <u>supported</u> /partially supported/not supported by references to relevant and reliable scientific literature	The main theoretical provisions and statements of the dissertation are supported by domestic and international scientific publications indexed in the Scopus and Web of Science databases, as well as materials from authoritative international organisations and official sources. The doctoral candidate uses both fundamental research in the field of human capital and contemporary studies on sustainable development, the green transition, ESG approaches, and the transformation of higher education. The theoretical provisions are compared with the results of

			current research and international experience, which ensures their scientific validity. The literature used is relevant to the subject of the research and provides a sufficient evidence base for the key statements of the dissertation.
		8.5 The literature sources used are sufficient /not sufficient for a literature review.	The list of references includes 287 sources, which indicates the substantial volume of scientific material reviewed. The literature review includes studies on human capital theory, higher education management, sustainable development, and the green transition. The doctoral candidate considers both fundamental theoretical provisions and the results of contemporary domestic and international research, which makes it possible to demonstrate the development of scientific views on the problem under study and to identify the main approaches to its investigation. The sources used correspond to the topic of the dissertation and are sufficient to form its theoretical foundation.
9.	Principle of practical value	9.1 The dissertation has theoretical significance: 1) yes; 2) no	The theoretical significance of the dissertation lies in the development of scientific understanding of human capital management in the higher education system in the context of the green transition. The doctoral candidate systematised theoretical approaches to human capital management and identified the main stages of their evolution. The author's interpretation of the concept of "green-oriented human capital in universities" is provided, which, along with professional knowledge and skills, takes into account environmental values, digital and interdisciplinary competencies. The results obtained expand the theoretical foundations of human capital management, taking into account the requirements of sustainable development and the specific features of Kazakhstan's higher education system. The theoretical provisions of the dissertation can serve as a basis for further research in the fields of human capital management and higher education management.
		9.2 The dissertation has practical significance and there is a high probability of applying the obtained results in practice: 1) yes; 2) no	The practical significance of the dissertation lies in the possibility of applying the developed mechanisms, models, and recommendations in the activities of higher education organisations in Kazakhstan. The developed mechanisms, multilevel model of stakeholder interaction, and modernisation roadmap can be applied in the development of university strategies, improvement of personnel policy, and development of environmental, digital, and interdisciplinary competencies. The practical orientation and applied nature of the developments determine a high probability of their use in the activities of higher education organisations.

		9.3 Are the practice offering new: 1) completely new; 2) partially new (25-75% are new); 3) not new (less than 25% are new)	The dissertation proposes new managerial solutions of practical significance for Kazakhstan's higher education system. The developed mechanisms cover institutional, educational, managerial, infrastructural, digital, and social aspects of human capital development in the context of the green transition. The multilevel model defines the interaction among stakeholders, while the roadmap provides for the phased development of environmental, digital, managerial, and interdisciplinary competencies. The presented developments make it possible to take into account sustainable development objectives in the personnel, educational, and managerial activities of universities. Overall, the proposed solutions are comprehensive in nature and have a high potential for practical application in Kazakhstan's higher education system.
10.	Quality of writing and design	Quality of academic writing: 1) high; 2) average; 3) below average; 4) low	The dissertation is characterised by a high quality of academic writing. The doctoral candidate presents the theoretical provisions, results of the empirical analysis, and practical developments consistently and logically. Scientific terminology is used correctly and consistently, while the main conclusions are formulated clearly and are well substantiated. The structure of the dissertation ensures a logical transition between sections and contributes to a coherent understanding of the research. Tables, figures, and analytical materials complement the text and provide a clear presentation of the results.
11.	Comments on the dissertation	The practical recommendations of the dissertation have an applied orientation and can be used to improve human capital management in higher education organisations. For the further application of the proposed mechanisms, specific conditions for their implementation and criteria for evaluating the results may be clarified. The dissertation has been completed at a high scientific level and has theoretical and practical significance.	
12.	The scientific level of the doctoral student's articles on the research topic (in the case of defending a dissertation in the form of a series of articles, official reviewers comment	The main results of the dissertation research have been published in 22 scientific papers, including 6 articles in international peer-reviewed scientific journals indexed in the Scopus database, 3 articles in scientific journals recommended by the Committee for Quality Assurance in Science and Higher Education of the Republic of Kazakhstan, and 13 papers in domestic scientific journals and proceedings of international scientific and practical conferences. The content of the publications corresponds to the topic, aim, and main areas of the dissertation research and reflects its key scientific results. The number and level of publications indicate sufficient dissemination and validation of the research results and their presentation to the domestic and international scientific community.	

	on the scientific level of each article of the doctoral student on the research topic)	
13.	Decision of the official reviewer (in accordance with paragraph 28 of the Standard Provisions)	Awarding of the degree of Doctor of Philosophy (PhD) in the educational program 8D04101 – “Management”.

The dissertation of Olzhebayeva Gulbakhyt Serikovna entitled “Mechanisms of human capital capacity management of higher education system of Kazakhstan in the context of green transition” meets the requirements for dissertations submitted for the degree of Doctor of Philosophy (PhD). The doctoral candidate deserves to be awarded the degree of Doctor of Philosophy (PhD) in the educational program 8D04101 – “Management”.

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