Regulation on the Procedure for Financing Research Projects by the New Uzbekistan University

Chapter 1. General Provisions

1. This Regulation has been developed by the Resolution of the President of the Republic of Uzbekistan No. RP – 5158 dated June 23, 2021, "On the Establishment of New Uzbekistan University", the Resolution of the President of the Republic of Uzbekistan No. RP –151 dated April 28, 2025, "On Measures to Further Improve the Activities of New Uzbekistan University" and the Minutes No. 4 of the Meeting of the Supervisory Board of New Uzbekistan University dated December 23, 2024.

2. This Regulation defines the procedure for financing research projects by "New Uzbekistan" University (hereinafter – the University).

3. The following key concepts are used in this Regulation:

Applied research – research primarily aimed at achieving practical objectives and solving specific problems through the application of new knowledge and the results of fundamental research;

Fundamental research – theoretical and/or experimental research aimed at obtaining new knowledge about the basic laws regarding the structure, formation, and development of nature, society, and humans, studying the interrelationships between them, as well as objects created as a result of a certain activity.

Innovation projects – research aimed at creating and producing innovation, with a defined implementation period, infrastructure, executors, funding source, and volume.

Research project – a complex of organizational, technical, and other necessary measures aimed at obtaining scientific and/or scientific-technical results, "know-how", and new technologies in the form of fundamental, applied, and innovation projects, with defined goals and objectives, executors and deadlines, sources, and means (regardless of their formation sources).

Electronic platform – an electronic platform developed for systematizing the processes of submission, acceptance, review, and selection of research projects.

Scientific and Technical Council of New Uzbekistan University (hereinafter – STC) – a collegial body established by the relevant order of the University Rector, coordinating the University's innovation and research activities.

Scientific expertise – activity aimed at studying, analyzing, and evaluating And preparing a conclusion regarding a project in order to make an informed decision.

External expert – a citizen of a foreign state involved on a contractual basis, based on the decision of the STC to conduct scientific expertise.

Research Infrastructure Development Fund (hereinafter – the Fund) – the Research Infrastructure Development Fund established by the Decree of the

President of the Republic of Uzbekistan No. RP – 151 dated April 28, 2025, “On Measures to Further Improve the Activities of New Uzbekistan University.”

Industrial partner – an industrial or sector enterprise interested in implementing the results of a research project into production and, accordingly, having a proposal for co-financing the project.

Authorized Unit – the Department of Research.

Research project leader (hereinafter – Project Leader) – an applicant for a research project approved in the established manner.

Research project participant (hereinafter – Project participant) – a person involved on a contractual basis to implement a research project within its scope.

Base calculation value (hereinafter – BCV) – the limited amount of financial and economic indicators established by the Decree of the President of the Republic of Uzbekistan No. DP – 5723 dated May 21, 2019.

Research project year – refers to a project period equal to 12 (twelve) months, calculated from the date of commencement of funding for the research project.

4. The following individuals may be applicants for financing research projects:

An academic staff member of the University;

An employee of the Institute for Advanced Studies (hereinafter – the Institute) under the University or the Great Eurasian Research Center whose job responsibilities include conducting research activities;

A master’s or doctoral student of the University or the Institute.

5. Depending on the duration and amount of funding, a research project may fall under one of the following categories:

Mega Research Project – with a funding amount ranging from 5,000 to 10,400 times the Base Calculation Value (BCV);

Medium Research Project – with a funding amount ranging from 1,041 to 4,999 times the BCV;

Small Research Project – with a funding amount of up to 1,040 times the BCV.

6. Depending on the set goals and objectives, and the form of implementation, research projects are divided into the following types:

Fundamental projects;

Applied projects;

Innovation projects.

7. Research projects should be aimed at solving urgent problems of the Republic of Uzbekistan and align with the priority areas of the University's research activities.

The priority areas of the University's research activities are approved by the STC based on the goals and objectives of the "Uzbekistan – 2030" Strategy, as well as the requirements of Resolution No. RP – 151 dated April 28, 2025, "On Measures to Further Improve the Activities of New Uzbekistan University." This is carried out together with the approval of the number and financing volumes of research projects by type to be implemented in the following year.

8. The announcement of research project competitions, review, acceptance, selection, and approval of documents, follows the scheme outlined in Appendix 1 of this Regulation.

9. Research projects must adhere to the minimal requirements outlined in Appendix 2 of this Regulation.

10. The Project Leader must have a minimum 3 (three) year employment contract with the University or Institute, except for master's and doctoral students.

In this regard:

If the employment contract with the Project Leader is terminated during the research project, the current Project Leader may either remain in position or be replaced by a new Project Leader based on a decision of the STC.

If it is not possible to appoint a new Project Leader, the research project shall be terminated based on a decision of the STC.

11. The Project Leader is personally responsible for forming the research project team.

Chapter 2. Announcement of Research Project Competitions, Review, Acceptance, Selection, and Approval of Documents

12. In May of each calendar year, the number and funding volumes of research projects to be implemented in the following year, by type, shall be approved by the STC.

13. The Authorized Unit forms a list of topics for research projects by June 1 from the University academic staff, employees of the Great Eurasian Research Center and the Institute, whose job responsibilities include conducting research activities, master's and doctoral students of the University and the Institute, and industrial partners.

14. The list of topics for research projects must reflect the results to be achieved at the end of these research projects; in necessary cases, additional requirements may be set based on the specific characteristics of the research project topic.

15. The Authorized Unit sends the list of topics for research projects to the relevant industrial partner for approval by June 5. The conclusion of the industrial partner on this matter must be submitted by June 25. In this regard:

The industrial partner’s conclusion on this matter may be submitted in a working procedure.

If the industrial partner's conclusion is not submitted within the specified period, the submitted topics are classified as agreed.

16. The Authorized Unit announces a competition for financing research projects on the University’s website by June 30.

This competition must indicate the following:

Research topics agreed upon with industrial partners;

Information on the results to be achieved at the end of the research projects;

Additional requirements for the research project (if applicable).

17. Within 15 (fifteen) working days from the announcement of the competition, the applicant must upload the research project to the electronic platform in the form provided in Appendix 3 of this Regulation.

18. After the deadline for submitting research projects, the Authorized Unit conducts a technical expertise of the research projects within 10 (ten) working days.

19. Within the scope of technical expertise, the following are carried out:

The submitted research project must correspond to the topic of the research project announced in the competition;

Verification of the completeness, accuracy, and compliance of the submitted documents with the requirements of this Regulation;

Identification of the existence of a research project similar to a previously submitted research project or a research project executed on the same topic and its duplication (anti-plagiarism).

20. After the submitted documents undergo technical expertise by the Authorized Unit, the applicant will be sent a notification about the results of the review to their email address.

In this regard, the research project may successfully pass technical expertise, or deficiencies may be identified, or it may be rejected.

If deficiencies are identified in the submitted research project, the applicant must address them within 3 (three) working days from the date of notification; otherwise, the application shall be rejected.

21. After the completion of the technical expertise, the research project undergoes scientific expertise within 1 (one) month. In this regard, depending on the type of research project, it is subjected to scientific expertise by the following:

Mega Research Project – a higher education institution included in the top 30 list of internationally recognized organizations' rankings;

Medium Research Project – external experts (excluding research projects where the annual funding value is higher than 2,500 times the base calculation value);

Small Research Project – STC.

22. After the completion of the technical expertise, the Authorized Unit sends the research project for review to the relevant body for scientific expertise.

23. Within the scope of scientific expertise, the research project is evaluated based on a 100-point scale according to the following criteria:

Scientific novelty and practical significance of the research project – up to 35 points;

Feasibility of implementation – up to 35 points;

Scientific potential and research output of the research team – up to 30 points.

If a research project receives a score below 60 points, it shall be considered as having failed the scientific expertise.

If a research project receives a score below 60 points, it shall be considered as having failed the scientific evaluation.

24. The result of the scientific expertise is automatically generated on the electronic platform.

This indicates whether the research project has passed or been rejected by scientific expertise.

25. The Authorized Unit prepares research projects that have successfully passed technical and scientific expertise for discussion at the STC meeting by September 5.

26. Research projects that have successfully passed scientific expertise are reviewed at the STC by September 15 in the form of an open discussion (presentation) with the participation of the Project Leaders. STC members have the right to ask the Project Leader questions about the research.

The presentation shall be evaluated based on the project's objectives, planned activities, research outcomes, and its potential implementation in education or industry.

The STC has the right to decide on conducting additional expertise to verify the correct and objective evaluation of the research projects.

27. At the STC meeting for the discussion of research projects, the research projects are approved and these approved projects are reflected on the electronic platform by the Authorized Unit.

When approving a research project, the following priorities must be considered:

Research projects prepared based on the topic of an industrial partner;

The amount of external grant funding to be attracted within the framework of the research project.

28. An order of the University Rector shall be issued within 5 (five) working days following the approval of the research projects..

29. If the quota for research projects allocated for the calendar year is not filled, the Authorized Unit may repeat the process in this chapter.

Chapter 3. Funding Procedure

30. Selected research projects are funded by the Fund.

31. Overall management and control over the Fund's activities are carried out by the Vice-Rector for Financial and Administrative Affairs.

32. The financing of a research project is based on its cost calculation.

33. The procurement of fixed assets and inventory within the scope of a research project is carried out in the following stages:

The Project Leader submits a request containing the list and description of fixed assets planned for purchase via the electronic platform;

The request is reviewed and agreed upon within 1 (one) working day by the Authorized Unit, the Financial Management Department, Material and Technical Support Service, and the Vice-Rector for Innovation and Research;

It is approved by the Vice-Rector for Financial and Administrative Affairs within 3 (three) working days;

Based on the approved request, Material and Technical Support Service carries out procurement processes based on the requirements of current legislation.

34. Project participants shall be engaged based on a civil law contract upon the recommendation of the Project Manager, following the procedure established by the Department of Human Resources, Recruitment and Operations with Foreign Specialists.

35. The maximum monthly salary of a civil law contract concluded with a Project Participant is calculated based on the following formula:

The limited amount of the monthly salary under the civil law contract concluded with the Project Participant shall be calculated based on the following formula:

$$OIH = LO \times MK$$

where:

OIH – the amount of the monthly salary under the civil law contract concluded with the Project Participant;

LO – the position salary calculated based on the basic official salaries of scientific and managerial staff participating in the implementation of state scientific programs funded by the State Budget, as approved by the Resolution No. 233 of the Cabinet of Ministers dated August 18, 2009;

MK – the special coefficient applied in calculating the Project Participant's salary.

36. When calculating the Project Participant's salary, the following special coefficient amounts are applied based on their work rate at their main place of employment:

1 Full-Time Equivalent – 0.5 coefficient;

0.75 Full-Time Equivalent – 0.75 coefficient;

0.5 or 0.25 Full-Time Equivalent – 1 coefficient.

37. The maximum monthly salary of a civil law contract concluded with a Project Participant may be increased based on the written consent of the University Rector.

38. The funds allocated for the implementation of the research project shall not be used for the following expenses:

Construction, reconstruction, and capital repair of buildings and structures;

Payments for security services of facilities;

Expenses for the purchase of vehicles, luxury soft furniture and accessories, mobile phones, business trips of staff who are not project executors;

Payment of travel expenses for commuting to work by public transport, special route vehicles or departmental vehicles;

Expenses for treatment and recreation, excursions and tours, sports sections, clubs, cultural and entertainment, physical education (sports) events, and the purchase of personal consumer goods.

Other expenses may be included in this list by the STC.

39. Based on the decision of the STC, the implementation period of the research project may be extended, and changes may be made to the financing volume. In this case, the calendar plan of the research project to be carried out during the extended period is re-approved by the STC.

40. All fixed assets procured using funds allocated for the research project shall be recorded on the University's balance sheet and shall be considered its property.

41. The rights to intellectual property objects created by the Project Leader and participants using the funds allocated for the research project shall belong to the University.

42. The Project Leader is responsible for the timely and targeted use of funds allocated for the implementation of the research project.

43. Financial control over the targeted use of funds allocated for the implementation of the research project is carried out by the Vice-Rector for Financial and Administrative Affairs and the Financial Management Department.

Chapter 4. Monitoring and Accounting of Research Projects

44. The Project Leader submits two reports (interim and final) on the research project to the STC twice in one project year.

In this case, the reporting interval must be at least 6 (six) months.

45. The report shall be accepted based on the implementation status of the research project in accordance with its calendar plan, the targeted use of allocated financial resources, the achieved results regarding publication of articles in leading international journals, and a comparative analysis of these results relative to the existing potential.

In this case, based on the results of the final report for one project year, the STC decides whether to continue or stop financing the research project.

46. Reports prepared for research projects implemented with the participation of industrial partners must also be approved by the industrial partners.

47. The Authorized Unit continuously monitors the implementation of the research project in the following forms:

Review of submitted annual reports by experts;

Defense of reports by the Project Leader at STC meetings;

Status of the research project’s implementation according to its calendar plan;

Targeted use of allocated financial funds;

Results achieved in publishing articles in leading foreign journals based on the research project’s results;

Final results obtained within each research project and their commercialization opportunities.

In necessary cases, independent experts and specialists may be involved in carrying out monitoring.

48. According to the results of monitoring, failure to complete the assigned tasks on time, as well as violation of reporting deadlines and financial discipline, may serve as grounds for the termination of funding upon the initiative of the STC.

49. At the end of the research project, its results are documented and submitted to the STC in the form of a research report, innovative development / patent.

50. The research project report approved by the STC is uploaded to the electronic platform by the Project Leader in the form of an abstract.

Chapter 5. Final Provisions

51. Anyone who violates the rules of this Regulation will be held responsible according to the law.

52. Matters not covered by this Regulation shall be determined by the decision of the STC.

53. Amendments and additions to this Regulation are introduced based on the relevant order of the University Rector.

ANNEX 1
to the *Regulation on the Procedure for Financing Scientific Research Projects* by Yangi O‘zbekiston University

SCHEME
for announcing the call for scientific research projects, reviewing, accepting, evaluating, and approving applications.

Stages	Responsible Units	Activities	Timeline
Stage 1	Authorized Department	Preparation of proposals regarding the number and funding volumes of scientific research projects to be implemented in the following year by type, as well as the priority areas of scientific research activity of “Yangi O‘zbekiston” University (hereinafter – the University), and submission to the University Scientific and Technical Council (hereinafter – STC).	During the month of May
Stage 2	STC (Scientific and Technical Council)	Approval of the number and funding volumes of scientific research projects to be implemented in the following year by type, as well as the priority areas of the University’s scientific research activity.	During the month of May
Stage 3	Authorized Division	Formation of the list of topics for scientific research projects.	By June 1
Stage 4	Authorized Division	Sending the list of topics for scientific research projects to the relevant industry partner for agreement and coordination.	June 5–25
Stage 5	Authorized Division	Announcing the call for proposals for funding of scientific research projects.	By June 30
Stage 6	Applicant |	Uploading the scientific research project to the electronic platform.	Within 15 working days

Stages	Responsible Units	Activities	Timeline
Stage 7	Authorized Department	Conduct a technical evaluation of the research project and send the results of the review to the applicant via email.	Within 10 working days
Stage 8	Applicant	Eliminate the identified deficiencies during the submission of the research project.	Within 3 working days
Step 9	Authorized Department	Send the research project for scientific expertise review according to its relevance after the technical expertise.	After technical expertise
Step 10	According to relevance: Higher Education Institution / External Expert / Scientific-Technical Council (STC)	Conduct scientific expertise of the research project.	Within 1 month.
Step 11	Authorized department	Prepare projects that have successfully passed technical and scientific expertise for the STC meeting	By the 5 september
Step 12	STC (Scientific-Technical Council)	Review and approve scientific research projects through open discussion (presentation).	By September 15.
Step 13	Authorized Department	Organize the signing of the University Rector’s order regarding the approved scientific research projects.	Within 5 working days

Appendix 2 to the Regulations on the Procedure for Financing Scientific Research Projects by Yangi O‘zbekiston University

MINIMUM REQUIREMENTS for Scientific Research Projects

No.	Indicator Name		Unit of Measurement.	Large	Medium	Small
I.	Deadline		yil	3	3	3
II.	Limited funding amount (annual)		BHM	10 400	4 999	1 040
	including:					
2.1.	the portion allocated for the purchase of equipment (at least)		Percent	60	60	33
III.	Number of participants (at least)		persons	10	6	1
IV.	Minimum requirements for the project leader					
	including:					
4.1.	involvement of a foreign scientist	number	persons	1	1	-
		Hirsch index3		20	5	-
4.2.	Involvement of a Doctor of Science		persons	1	-	-
4.3.	Involvement of a Doctor of Philosophy		persons	-	1	-
V.	Performance indicators					
	including:					
5.1.	Attracting foreign grants		percentage (%)	20	-	-
5.2.	Number of articles ("Q1") (annual)		pieces	10	2	1
5.3.	Creation of innovative developments (prototype) or patents		pieces	1	1	1
5.4.	Number of doctoral candidates to be involved		persons	3	1	-

No.	Indicator Name	Unit of Measurement.	Large	Medium	Small
5.5.	Number of master's and bachelor's students to be involved	persons	2	1	-
5.6.	Development of the master's degree program	pieces	1	-	-
5.7.	Guidance of a doctoral candidate to dissertation defense	persons	3	1	-
5.8.	Number of students under scientific supervision	persons	10	3	-

Note:

The composition of equipment includes laboratory instruments and related materials, raw materials, software, as well as expenses for infrastructure development.

In relation to the volume of financing for the research project.

Determined based on the Scopus bibliographic database.

Must be a doctoral candidate or student of "Yangi O‘zbekiston" University.

Appendix 3

Sample

to the Regulation on the Procedure for Financing Research Projects

by Yangi O‘zbekiston University

New Uzbekistan University Research Project

PROJECT

“Research on Energy Saving Automation Technologies for Urban Rail Transit Systems and EV charging stations”

Field of study:

Technical Science

Project Leader:

Sanghyuk Lee, DSc, Professor

Tashkent-2025

Project description

1.1. Project abstract *It should not exceed 150 words, including a brief description of the essence of the project, its practical importance, the relevance of providing a scientific solution to the existing problem and solving it.*

"As the electrification of urban transportation progresses rapidly, the associated increase in energy consumption and negative impacts are also growing swiftly. The rising energy demand in urban rail transit and electrical vehicles (EVs) imposes a burden on the sustainable development of these systems. From the international trends, Chinese urban rail systems consumed a total of 227.92 billion KW-hours in 2022, representing a 6.89% increase year-over-year, making them one of the largest single loads on many city power grids. It is also shown relative with the developing countries including Uzbekistan. As major electricity consumers, urban rail networks typically operate independently from the distribution grid, and past studies rarely considered them as targets for demand-side management. However, in recent years, as urban land and power resources have become increasingly scarce, some cities have begun exploring the scientific integration of urban rail power systems with city grids.

In this regard, more effective railway and logistic optimization research is needed. Furthermore, recent drastic increase of electrical vehicle (EV) energy management is also emphasized on the charging station issue. Together with electrical source management cough our attention. So it is timely to analyze and do the research on the said issue."

1.2. The ability and advantage of the implementing organization and project participants in the implementation of the project.

"Research team already contacted a local company for the collaboration, and got a positive reply. We are expecting cooperation with Uzbekistan railway JCR and UzAsystem to join in the project. Their cooperation could be helpful in the data acquisition, verification of the project output and improvement of the research quality."

Add description of how the team has the right competencies for this project

1.3. Information about the scientific laboratory base and existing scientific infrastructure objects for the implementation of the project (no more than 200 words):

"The project will be implemented at the laboratories of New Uzbekistan University, which are equipped with modern computing clusters and simulation tools essential for transport system modeling, energy optimization, and smart grid integration. The university's Advanced Robotics and Intelligent Systems Laboratory provides the necessary infrastructure for algorithm testing, energy flow modeling, and simulation of electrical vehicle charging behaviors. Additionally, the Center for Urban Innovation and Sustainable Infrastructure at the university supports multidisciplinary research focused on urban transport, logistics optimization, and energy efficiency.

The research team has access to licensed software platforms such as MATLAB/Simulink, PSS®E, OpenTrack, and HOMER Grid, which are critical for modeling electric traction systems and performing power flow analyses. Furthermore, existing partnerships with industrial actors like Uzbekistan Railways JSC and UzAsystem will enable real-time data integration and empirical validation of proposed models. The university also maintains high-speed data servers and advanced storage infrastructure to handle large-scale simulations and data processing securely and efficiently. These resources collectively ensure that the project can be carried out with high scientific rigor and technological precision."

1.4. Analysis of the results of previously completed/ongoing fundamental, applied and innovative projects within the framework of the project (if a project was previously implemented on the basis of a grant within the scope of the project – its results (scientific basis), the differences from the research results planned for implementation within this project

should be clearly stated (should not exceed 500 words):

"The project is developed by us, and proposed by mutual interest with us and the Chinese team. We are continuously interested in energy efficiency in Uzbekistan, even the Chinese team focused on the logistics before. Herewith, optimization of energy based on the network system reached a common goal from both of us.

From the methodology, analytic network modeling will be carried out by the cooperation with the Chinese team, and we will complete model verification together with a neural network point of view by the cooperation with Uzbekistan railway JCR. Optimal usage derivation will be cooperated and the results will provide a good foundation for the energy management viewpoints; helpful to the railway company and government policy for the consideration of effective energy management."

Information about the project participants

No.	Full name of the project participants	Role in the project (Position)	Scientific degree and title	Main place of employment at the time of application	The number of scientific works published within the topic of the project in the last 3 years		Work (tasks) performed within the project
					Total	In Web of Science or Scopus journals	
1.							
2.							
3.							
4.							
5.							
...							

2.1. Scientific problem to be solved in the project *(should not exceed 150 words)*:

"Previous studies have specifically proposed an integrated optimization model for energy-saving train operation and scheduling, combined with energy storage devices, to utilize more regenerative braking energy and enhance system energy efficiency. EVs orderly charging management technologies provide numerous advantages, such as reducing peak loads on the grid and offering energy storage services, thus avoiding the negative effects of unmanaged EVs charging. With the advancement of smart grid technologies, installing more renewable photovoltaic generation and roadside energy storage systems within urban rail transit systems can effectively reduce the energy consumption of urban rail systems and EVs charging stations management as well."

2.2. Purpose and objectives *(no more than 1,500 words, the purpose set for the project team to solve the stated scientific problem should be disclosed, and objectives related to obtaining new scientific developments (products/technologies), technical, technological, technical-economic effects, planned important scientific results, new product markets, export orientation and import substitution, and tasks related to gaining a worthy place in the market of goods (products, services) based on the creation of intellectual property objects should be consistently substantiated)*:

"Rapid development of new energy sources, smart rail transit, and EVs has led to increasingly tight energy coupling relationships within electrified urban transportation systems. However, at the current stage, there are still issues such as significant increases in grid energy consumption and instability in grid loads due to high energy consumption by trains and disorderly charging of EVs. Fully utilizing the close energy coupling relationships between different transportation systems to design innovative demand-side scheduling optimization models is crucial for enhancing the grid's capacity to absorb renewable energy, alleviating the need for urban grid upgrades, and promoting energy savings and efficiency improvements in electrified urban transportation systems.

This project will develop a demand-side scheduling optimization model that takes into account distributed photovoltaic generation to optimize the operational scheduling of urban rail systems and the orderly charging and discharging strategies for EVs. The scheduling optimization model is divided into three main modules: an integrated information prediction module, a comprehensive energy management module with day-ahead and real-time layers, and an integrated optimal decision output module. This project will utilize *data statistical modeling, information forecasting, mathematical modeling, and mathematical planning* as its fundamental research methodologies together with *deep learning (DL) and artificial intelligence (AI) configuration*. Considering the large-scale clustering effect of trains, EVs, an attempt will be made to establish a probabilistic model of electric user travel behavior, and based on this probabilistic model, travel parameters for EVs will be constructed. For photovoltaic generation, forecasting models will be developed using historical data and weather conditions to predict the output of photovoltaic power. The results of these data forecasts will provide optimized parameters for the mathematical optimization models established in this project.

The project will attempt to construct a mathematical optimization models;

- Day-ahead optimization model
- Real-time optimization model

Based on the two-level mathematical optimization models constructed, this project will utilize mathematical programming algorithms and solvers to compute the developed optimization models, thereby providing optimal scheduling decisions for the comprehensive energy management module.

Schematic diagram of the relationship between urban rail transit, EVs, and distributed generation within the smart grid is shown in Figure 1. This spatiotemporal coupling presents

additional challenges for solving the energy balance problems in this project.

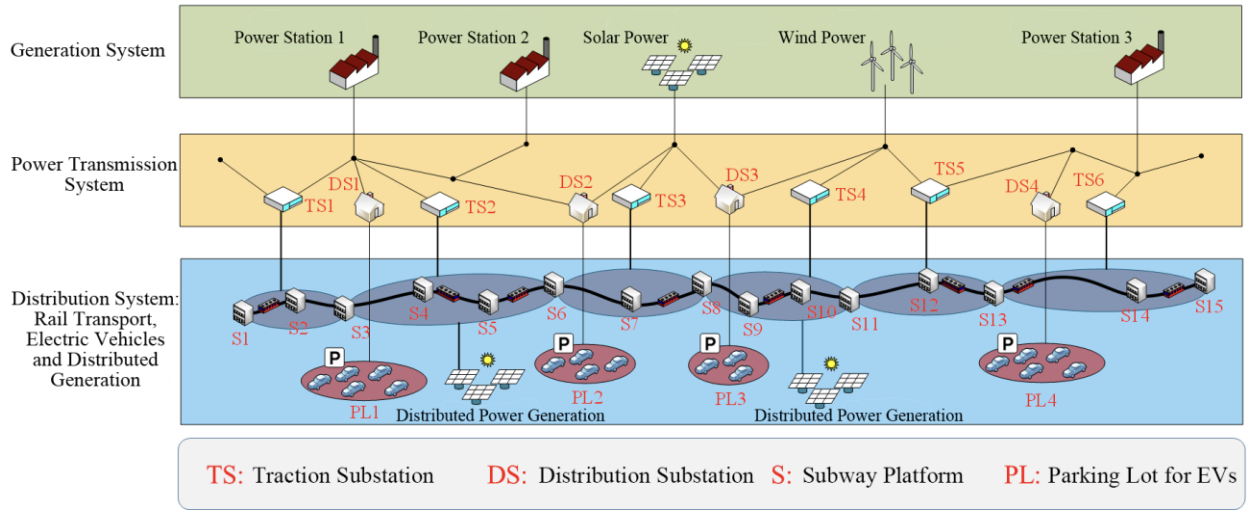

Figure 1: Schematic diagram

Additionally, NN structure is also proposed to predict and get the optimal solution. With the general structure of deep NN, we emphasize the training. Faithful training procedures guarantee high performance in the test, and it is known that the qualified and diverse training data is closely related to its outputs . Herewith, more faithful training result is obtained by combining supervised and unsupervised learning. Research goal is to compare the performance between analytical and deep NN models, so it helps to organize a more sustainable model to optimize the energy network."

2.3. The degree of study of the research problem, the achievements in the scientific and research areas of world science and the analysis of competitors *(should not exceed 500 words)*:

"Research on the smart grid, energy efficiency, and complex networking has been emphasized to make effective management of energy. Each research topic is focussed and derived by numerous researchers for the last decades. However, it is still a challenge to resolve the problem in the integrated system. In this regard, the research proposal is timely and promising from the academic and industrial viewpoints.

As it is proposed, we have clear plan to take information;

PI has experience developing hierarchical wireless sensor network research for energy efficient synchronization. In the research, multi-hop framework provides the accuracy of measurement time estimation and the number of transmission. It would be guaranteed the data transfer in between hierarchical structures in the proposed network. Continual research was also carried out in the successive research. Especially, gateway overloaded in multi-hop structure is challenging not only energy minimization but also lowering computational complexity while maintaining the synchronization accuracy was crucial to the design of time synchronization scheme. It was resolved via a framework of reverse asymmetric time synchronization for resource-containing multi-hop wireless sensor networks and proposed a beaconless energy-efficient time synchronization scheme based on reverse one-way message dissemination. We also verified outperformed results in experiments. Research output is more feasible by the cooperation with Chinese research partners.

The Chinese applicant has long been engaged in fundamental research in the fields of rail transit and complex networks, specifically including optimization of train operation control, application of complex network theory in large transportation and power networks, and energy management technologies for storage devices and new traction systems. Related research has been

published in authoritative international journals such as IEEE Transactions on Intelligent Transportation Systems, IEEE Transactions on Transportation Electrification, IET-GTD, IET-RPG, Journal of the China Railway Society, and Journal of Electrical Engineering."

2.4. Scientific novelty of the research, possibilities of solving the set tasks and obtaining the planned results *(should not exceed 1,500 words)*:

"The project aims to organize an efficient energy network and scheduling based on the traffic data and others from renewable energy sources to the consumers (trains, EVs). Hence, it is challenging to resolve such a complex system, so it is considered as the hierarchical structure. Hence, we cooperate with the Chinese partner on constructing a multi-level, multi-dimensional optimization model. And the decision variables include train operation timing and the charging (or discharging) logic control of EVs will be communicated with Uzbekistan railway JCR. These variables determine corresponding energy consumption units for train traction energy, regenerative braking energy, EVs, and photovoltaic power generation. These four types of energy consumption units are subject to spatiotemporal constraints, and under these constraints, energy summation as described is performed to minimize energy consumption in alignment with economic costs.

To solve the proposed tasks on multi-level design problems of complex scheduling optimization models under the condition of limited arithmetic power, we try to approach;

Even though there is other research on the complex system, the hierarchical structure energy optimizing model is proposed by us. It is quite meaningful to implement the model and analyze its effectiveness. However, research members possess much experience in mathematical modeling in complex systems, and complex chemical processes. So, we are sure to provide the high complexity of large-scale models together with model checking simulation. Additionally, we will add the idea to make a model with NN model structure. With the conventional data, the research team can propose relevant heuristic models.

The challenge of analyzing multi-level design problems of complex scheduling optimization models under the condition of limited arithmetic power will be resolved as follows;

Solving the optimal solution and scheduling is challenging. We will take two ways to verify the research outcomes; energy delivery and consumption within the same spatial and temporal computing unit by mathematical calculation and proof. And the heuristic models - NN structure - is also considered by training data and test data. Training data could be used by the existing data, and it will be accomplished by the various training methods such as domain adaptation, k-fold to avoid any over/under fitting problem.

We have enough potential from each member; from the analytical derivation of model to NN model construction. Furthermore, cooperation with Chinese partners and Uzbek railway companies is helpful to draw feasible research outputs."

2.5. The proposed method and scientific approaches to provide a scientific solution to the problem *(in which the proposed method, methodology and approaches should be presented in a logical sequence, justified with diagrams based on the nature of the project, the design of the experimental study (if planned), information about the experimental groups should be provided, i.e. the "control" and experimental groups should be justified, and statistical processing methods should be explained, The relationship between the methods and materials used for the research and the experimental samples to be used must be demonstrated with calculations, not exceeding 1,500 words)*:

"This project will utilize data statistical modeling, information forecasting, mathematical modeling, and mathematical planning as its fundamental research methodologies. Given the dynamic

nature of train running, EVs and the characteristics of photovoltaic generation, the project will employ various data forecasting methods. Considering the large-scale clustering effect, travel parameters for EVs will be constructed based on this probabilistic model. For photovoltaic generation, forecasting models will be developed using historical data and weather conditions to predict the output of photovoltaic power. The results of these data forecasts will provide optimized parameters for the mathematical optimization models established in this project.

For a mathematical optimization model, which can be divided into two levels based on the hierarchy of the energy management system. The first level is *the day-ahead optimization model.* This model will be based on predicted day-ahead data, such as the next day's electric vehicle travel and new energy generation situations. The second level is *the real-time optimization model,* which will rely on real-time onsite data, such as real-time electric vehicle travel, short-term forecasts of photovoltaic generation. This model will further optimize the more dynamic orderly charging management strategies for EVs. Based on the two-level mathematical optimization models constructed, this project will utilize mathematical programming algorithms and solvers to compute the developed optimization models, thereby providing optimal scheduling decisions for the comprehensive energy management module.

The project aims to propose a multi-level energy management model that includes data forecasting, day-ahead and real-time layers of energy management modules, and decision outputs. Initially, a data forecasting module based on historical and real-time data will be constructed to deliver forecasted information to the energy management module. The energy management module encompasses both day-ahead and real-time layers; based on the characteristics of optimization parameters. The real-time optimization module will receive the day-ahead decision information from the day-ahead optimization model for the urban rail system, providing real-time management decisions for dynamically active electric vehicles and roadside energy storage devices, ultimately achieving comprehensive energy management decisions for various electrified transportation systems.

The following will elaborate on three critical steps in the technical roadmap of this project: *constructing a multi-level system for the energy management module, computing multi-energy interaction balances, and constructing and solving multi-dimensional optimization models.*

Initially, based on the historical database and real-time data, day-ahead forecast information for train passenger travel, EVs travel, and photovoltaic distributed generation is obtained. This forecast information is categorized into day-ahead and real-time predictive data based on the length of the forecast period. The day-ahead forecast information is provided to the day-ahead level of the comprehensive energy management module. The optimization model within the day-ahead level utilizes this forecast information to calculate day-ahead optimization decision data: orderly charging and discharging of electric vehicles and day-ahead decisions for urban rail operation scheduling. The decision data for the urban rail transit system is then supplied to the real-time level of the comprehensive energy management module, providing this level's real-time optimization model with optimized results for urban rail operation timing and energy-efficient operation.

This model processes the train operation scheduling optimization, which has lower dynamics but higher computational complexity, at the day-ahead level first. In the real-time level, the train operation management and scheduling results calculated at the day-ahead level are input as parameters to the respective modules. This approach significantly reduces the computational load on the optimization algorithms in the real-time level, enhancing computational efficiency while ensuring the quality of optimization.

A mathematical model will be constructed between the train operation timing and train energy consumption units. Based on the theory of optimal train control, for each segment of operation timing, there is a corresponding optimal mode of train operation that results in the lowest traction energy consumption and generates associated regenerative braking feedback energy. This project utilizes a mixed-integer programming algorithm to determine the linear relationships between each operation timing requirement and the corresponding train operations, traction energy consumption, and regenerative braking energy.

According to the total running time requirements and the timing requirements between platforms, the operation timing and departure intervals between adjacent stations determine a periodic train operation timetable. This timetable generates a series of train energy consumption units with spatiotemporal characteristics, which have linear relationships with the operation timings and departure intervals between stations. Within the train operation timetable, traction and regenerative energies can be identified within different power supply zones and price periods. Each train's corresponding energy consumption unit will possess temporal characteristics determined by the operation timing and departure intervals; the spatial characteristics of these units are defined by their positions between stations. This setup dictates the summation operations within the same computational unit—only energy consumption units that satisfy the same computational unit conditions can interact and be summed. By defining the basic quantity of energy sub-modules using a baseline timetable, the entire computational model no longer depends on complex linear modeling methods like conditional judgments, significantly reducing model complexity and enhancing the efficiency of model solutions.

In this project, the photovoltaic generation forecasting module uses solar irradiance and ambient temperature as environmental variables and employs machine learning algorithms for short-term and long-term predictions of solar power generation. Based on the generation of spatio-temporal information provided by the information prediction module, the model will decide how to sum up whether a certain.

Figure 1 displays a schematic diagram of the relationship between urban rail transit, EVs, and distributed generation within the smart grid. Within the distribution network, these three elements are interconnected through spatial electrical coupling and temporal operational coupling. The electrical coupling is influenced by the same distribution interval within the distribution network, while the operational coupling is affected by the same price interval within the smart grid. This spatiotemporal coupling presents additional challenges for solving the energy balance problems in this project.

The optimization model initially calculates the total traction energy consumption and total braking energy consumption for a given train *m* under fixed operation timing conditions, thereby establishing a basic energy consumption unit. This basic unit can interact energetically with EV clusters and trains within the same power supply interval. For two energy consumption units located within the same power supply segment and price zone, the electrical energy loss generated by traction operations—termed "positive" energy consumption—and the electrical energy fed back by regenerative braking—termed "negative" energy consumption—offset each other. EVs and their energy storage devices connected to the grid within the same power supply segment and price zone can absorb surplus regenerative braking feedback energy.”

2.6. Description of the planned final result (new development, technology, product) *(here, a precise description of the important scientific result - product, new development, technology - to be achieved at the end of the scientific project should be briefly and concisely stated, not exceeding 500 words)*:

“Considering the spatiotemporal characteristics of train operations and the orderly charging (and discharging) of EVs, as well as the energy coupling relationship between photovoltaic new energy and electric loads in the power grid, this project will develop a demand-side scheduling optimization model for urban electrified transportation. This model aims to reduce electricity costs for electrified transportation systems and enhance system stability. The expected outcomes are as follows:

1. Construction of a multi-level scheduling decision system that includes information forecasting, and the system addresses computational efficiency issues associated with algorithms for complex dynamic problems. Additionally, all feasible data make it possible to apply AI and DL NN models. The model helps to provide additional information with the analytical results.

2. Development of an integrated demand-side scheduling optimization model that encompasses electrified highway transportation, rail transportation, and new energy generation. This model balances the cross-system energy complementarity in the "generation-storage-use" process of new energy production.

3. The research output could be the big foundation to the energy saving strategy from the central and local government as well. Furthermore, electrical energy generation via renewable-side can contribute to green friendly technology over society and government policy.

With the obtained research results, we can be expected to make output into the academic outcomes;

1. Q1 and Q2 professional academic journal publications together with Chinese research partners, and continual cooperation.

2. Top tier international conference publications. It is to advertise our research outputs over the academic society. And encourage young researchers to get the motivation for the research.

3. Planned co-workshop with Chinese partners can promote more active research cooperation in the future.”

2.7. Analytical indicators of the existence (sufficiency) of the need (demand) for the research results *(in which industry (industry) the important scientific result obtained as a result of the scientific project - product, new development, technology, how much demand/need is there per year/month if a product/service is produced based on this technology (analysis based on numbers should be provided, no more than 300 words):*

“The project provides effective energy management in a smart grid. Hence, its effects to social, technologies, academic view points;

Society effects: it provides an energy saving framework to the energy distributing systems. Analyzing and concentrating research on the energy network including analytical methods and heuristic approaches make rich options to us. And the successful research outcomes could be the food knowledge to support national infrastructure.

Technology: By the cooperation of local companies, it is also possible to share the technology and help for their successful business. Finally, it became a contribution to Uzbek society by way of technological developments. Obtained outcomes could be applied to patents inside or outside of Uzbekistan.

Academic: the results also can be applied to the professional academic journal to raise up our research output. We are sure that our publications upgrade our academic level - we can publish 10 + academic papers in prestigious journals.”

2.8. Indicators showing the comparative advantage of the new scientific development (product, technology) being created over foreign/existing analogues) (in this case, the important scientific result obtained at the *end of the scientific project - the new development, product, technology, in comparison with its foreign analogues, should be compared and analyzed in numbers. If such products are imported, the prospects for replacing imports and organizing the production of products based on this technology using local raw materials in the future should be deeply analyzed, not more than 500 words)*:

"The research outcomes could have competitive advantages than the existing research. Because we will deliver the integrated energy networks with hierarchical structure. It is not yet published and discussed even by the consulting company. Based on the previous research work from a Chinese partner, we provide a relevant network model with an economic evaluation model together with AI/DL neural network structure.

The results would have practical advantages to apply to the existing energy distribution system. In this regard, expected collaboration with local energy consulting companies including UzAssystem gives beneficial information to the energy network framework. Most of all, energy source generation is related to photovoltaic - renewable energy, so it could be extendable to the renewable energy generation policy as well."

2.9. A chronological description of the new scientific development (product, technology) planned to be achieved at each stage (year) of the project implementation - research results *(whereby the new development (technology) to be created as a result of the scientific project should be described separately, in a logical sequence, by year, and should not exceed 500 words)*:

"First year: *Work plan*

As with noted in the research plan, we have concrete plan on the first year as follows;

1. Data collection - it will be cooperated with local company, and will be cooperated with Chinese research partners

2. Model verification start with DL/AI modeling and Comparison with analytical model and data

3. Modeling completion and continue to amend/Extend to hierarchical structure, and verify its usefulness

4. Together with railway power distribution, EV charging station optimization

5. Integrate the model and start to scheduling/Analytical and DL/AI model comparison with the scheduling algorithm

To get the tangible results of 1, 3, and 5, we need a visit/invitation trips. One time to Guangzhou, China, and inviting Chinese collaborators. Additionally, we also collaborate with Uzbekistan railway JCR or the traffic department of Uzbekistan.

Second year: *Work plan*:

In the second year, we will concrete the research plan and try to summarize the research output in publication, advertise, and open forum to inside/outside of Uzbekistan with the following plans;

1. Workshop organization between two research partners (Uzbekistan and Chinese)

2. Research output improve and amend via on site/online meeting

3. Start to submit the result to the high impacted Journal and top tier international conferences

4. Continue to amend and submit papers

5. Open seminar to the local students - no limitation

6. Get the feedback and ready for the further research collaboration with local company and Universities

To reach the research goal, concluding workshops in Uzbekistan and China will be open to outsiders. Besides workshops, a company invitation seminar or small workshop in Uzbekistan is planned. And high impact journal publications will be continued by the collaboration with Chinese partners. Finally, more promising research topic development will be carried out via close communication with local companies and Chinese partners."

2.9. Commercialization potential (possibility, level) of the project results *(in this case, how the research result will be commercialized (what social effect will be obtained as a result of its application for practical purposes in the field of social and humanities sciences), a clear assessment of the commercial potential of the new scientific development to be obtained, and in fundamental research, the project results will serve as the basis for the commercialization of future scientific developments, as well as a substantiated commercialization plan, the availability of a resource/raw material base and the necessary infrastructure (scientific laboratory, production base for serial production in the future) for the production of products/services based on the new scientific development (technology) to be created should be justified , not more than 1,000 words):*

"The project is much extendable to several areas; smart grid for energy saving; renewable energy construction such as photovoltaic or wind farm; EVs increase. As mentioned, the project aims to organize an effective energy management system. It includes everything from renewable energy generation to energy consumption. So it needs to be designed from the demand side. In this regard, we focus on the following expected infrastructure planned in Uzbekistan.

● There could be more subways construction due to the increase of populations from outside of Tashkent, even at this time five subway lines including construction. Hence, the project results could be the good background to make a plan on the huge project. Hence, an optimized energy distribution system and energy generation plan from the demands are becoming more than important to save energy.

● Increasing number of EVs. It is quite natural to consider constructing more EVs charging stations to avoid any traffic delay. More effective power delivery to the stations can be carried out by the project outputs.

Many energy consulting companies have interest in the mentioned smart grid and EVs station installation. So it becomes a good opportunity to provide and cooperate with them on the successive project or business. Furthermore, it can be another chance to export our knowledge and experience to neighboring countries with the obtained knowledge."

2.10. Analysis of the risk of project failure, methods for its assessment and mitigation *(this should include all the possibilities of failure to achieve the project's goal, including failure to implement it, as well as other factors and information that could negatively affect the implementation of the research and the achievement of results , not more than 500 words):*

"Even if we are optimistic on the research outcomes, risk can exist. We have another plan to avoid such embarrassing conditions. Following risky situations can be happen;

● Data acquisition

● Output realization

Useful data is essential for us to accomplish the goal. We need real data even if we show the result by simulation - traffic information, daily and monthly electricity consumption, EV related data and so on. First, we try our best to get useful data by communicating with government departments and consulting companies if needed. Otherwise, share the information with Chinese research partners, they already have. If we use the Chinese data, results are to be revised by the Uzbekistan circumstances.

Our research team members' human resources are enough to realize the outputs. However, it is not easy to apply a real system. So it will be verified through academic publication, conference presentations, and open forum to government officers or experts in the actual fields.

As mentioned, all research members' research backgrounds include electrical engineering, computer science, and economics; so it covers energy distribution, programming, and economic evaluation."

2.11. Additional information *(if necessary, other information related to the implementation of the research and obtaining the results may be provided (not more than 300 words)*:

Project implementation costs

Thousand soum

No.	Type of expenses	Total Expenditure Amount	Including for Each Year :		
			Year 1	Year 2	Year 3
	Multiples of the Basic Calculation Amount	-	-	-	-
	In thousand soums	-	-	-	-
1	Salary costs	-	-	-	-
	Social tax (12%)	-	-	-	-
2	Travel expenses	-	-	-	-
3	Expenses for Purchasing Equipment, Technical Means, and Other Tangible Assets Necessary for Scientific Research (equipment installation and commissioning)	-	-	-	-
4	Expenses for purchasing materials and components for scientific research	-	-	-	-
5	Other Expenses for Project Implementation	-	-	-	-

Salary costs*

Year 1

Thousand soum

Project position and participant name	**Scientific degree (DSc, PhD, None)**	**Full-time Equivalent**	**Monthly salary costs**	**Calculated monthly salary (E*F)**	**Work duration (in months)**	**Total**
Project Leader (name)				-		-
Foreign Scientist (name)				-		-
Chief Scientific Officer (name)				-		-
Leading researcher (name)				-		-
Senior researcher (name)				-		-
Junior researcher (name)				-		-
Lab technician (name)				-		-
				-		-
....				-		-
Total (annual)				-		-
Social tax (Fixed percentage)						-
Total (monthly) salary + social tax)						-

Year 2

Thousand soum

Project position and participant name	**Scientific degree**	**Full-time Equivalent**	**Monthly salary costs**	**Calculated monthly salary (E*F)**	**Work duration (in months)**	**Total**
Project Leader (name)				-		-
Foreign Scientist (name)				-		-
Chief Scientific Officer (name)				-		-
Leading researcher (name)				-		-
Senior researcher (name)				-		-
Junior researcher (name)				-		-
Lab technician (name)				-		-
....				-		-
Total (annual)				-		-
Social tax (Fixed percentage)						-
Total (monthly) salary + social tax)						-

Year 3

Thousand soum

Project position and participant name	**Scientific degree**	**Full-time Equivalent**	**Monthly salary costs**	**Calculated monthly salary (E*F)**	**Work duration (in months)**	**Total**
Project Leader (name)				-		-
Foreign Scientist (name)				-		-
Chief Scientific Officer (name)				-		-
Leading researcher (name)				-		-
Senior researcher (name)				-		-
Junior researcher (name)				-		-
Lab technician (name)				-		-
				-		-
....				-		-
Total (annual)				-		-
Social tax (Fixed percentage)						-
Total (monthly) salary + social tax)						-

Travel costs

Year 1 *Thousand soum*

Destination	Project position and full name	Number of days	Transportation costs	Hotel expenses	Daily allowance	Total expenses
						-
						-
...						-
Total:						**-**

Year 2 *Thousand soum*

Destination	Project position and full name	Number of days	Transportation costs	Hotel expenses	Daily allowance	Total expenses
						-
						-
...						-
Total:						**-**

Year 3 *Thousand soum*

Destination	Project position and full name	Number of days	Transportation costs	Hotel expenses	Daily allowance	Total expenses
						-
						-
...						-
Total:						**-**

Equipment costs

Year 1 *Thousand soum*

Type of expense	Justification for planned purchase of equipment, technical means, and other tangible assets	Quantity (pieces, kg, etc.)	Price per unit (goods, product, work, service)	Amount of funds financed from the budget	Other contributor funding (if co-funding is planned)	Total
Stationery:						
1.				-		-
2.				-		-
...				-		-
Office equipment:						
1.				-		-
2.				-		-
...				-		-
Equipment:						
1.				-		-
2.				-		-
...				-		-
Inventory purchase:						
1.				-		-
2.				-		-
...				-		-
Other similar expenses						
1.				-		-
2.				-		-
...				-		-
Total:						-

Year 2

Thousand soum

Type of expense	Justification for planned purchase of equipment, technical means, and other tangible assets	Quantity (pieces, kg, etc.)	Price per unit (goods, product, work, service)	Amount of funds financed from the budget	Other contributor funding (if co-funding is planned)	Total
Stationery:						
1.				-		-
2.				-		-
...				-		-
Office equipment:						
1.				-		-
2.				-		-
...				-		-
Equipment:						
1.				-		-
2.				-		-
...				-		-
Inventory purchase:						
1.				-		-
2.				-		-
...				-		-
Other similar expenses						
1.				-		-
2.				-		-
...				-		-
Total:						-

Year 3

Thousand soum

Type of expense	Justification for planned purchase of equipment, technical means, and other tangible assets	Quantity (pieces, kg, etc.)	Price per unit (goods, product, work, service)	Amount of funds financed from the budget	Other contributor funding (if co-funding is planned)	Total
Stationery:						
1.				-		-
2.				-		-
...				-		-
Office equipment:						
1.				-		-
2.				-		-
...				-		-
Equipment:						
1.				-		-
2.				-		-
...				-		-
Inventory purchase:						
1.				-		-
2.				-		-
...				-		-
Other similar expenses						
1.				-		-
2.				-		-
...				-		-
Total:						**-**

Materials and component costs

Year 1

Thousand soum

Materials and complement name	Justification for planned purchase of materials and components	Quantity of Materials and Components	Price of Materials and Components	Total expenses
For example, reagents and reactants:				
1.				-
2.				-
3.				-
				-
				-
				-
				-
Total				-

Year 2

Thousand soum

Materials and complement name	Justification for planned purchase of materials and components	Quantity of Materials and Components	Price of Materials and Components	Total expenses
For example, reagents and reactants:				
1.				-
2.				-
3.				-
				-
				-
				-
				-
Total				-

Year 3

Thousand soum

Materials and complement name	**Justification for planned purchase of materials and components**	**Quantity of Materials and Components**	**Price of Materials and Components**	**Total expenses**
For example, reagents and reactants:				
1.				-
2.				-
3.				-
				-
				-
				-
				-
Total				**-**

Other Implementation costs

Year 1

Thousand soum

No.	Type of expenses	Quantity	Price	Total
				-
				-
				-
	Total			-

Year 2

Thousand soum

No.	Type of expenses	Quantity	Price	Total
				-
				-
				-
	Total			-

Year 3

Thousand soum

No.	Type of expenses	Quantity	Price	Total
				-
				-
				-
	Total			-

Indicator Metrics for Intellectual Activity Results

No.	Name of the indicator	Achieved in the last 3 years	Planned within the project
1	Number of articles published in indexed international foreign journals	72	15
2	Number of articles in local journals	0	4
3	Number of articles in international journals (excluding Scopus/WoS)	49	5
4	The number of theses prepared at the undergraduate level	200	240(total undergraduate students)
5	The number of prepared master's theses	8	program open is planned
6	The number of prepared doctoral theses (PhD , DSc)	3	recruiting is planned
7	Number of published monographs	1	0
8	Number of training manuals published		0
9	Number of textbooks published	2	1
10	Number of intellectual property objects	6	2

Implementation of the project

CALENDAR PLAN*

No.	**Works to be Performed **** *(by months for each year of the project)*	**Implementation/Reporting Deadline*** **	**Form of report to be submitted**
First year			
1.	Kick-off meeting, Data acquisition	February 2025	
2.	Analytical model design, DL/AI structure propose	April 2025	
3.	Hierarchical model construction	July 2025	
4.	Model validation, and simulation to check, conference and journal submission	October 2025	
5.	First year workshop invitation with Chinese partners	December 2025	
6.	Submit Interim (annual) report	*From the month in which the first year of the project ends until the 15th of the following month*	Interim (annual) report
Second year			
1	Model analyzing and evaluation, and integration from source to consumer	February 2026	
2	Two models - analytical and heuristic model - comparison and amend. Conference attend, and journal submission	April 2026	
3	Modeling finalization, and evaluate with actual data from the economic point of view	July 2026	
4	Visit China for the complement of the project	September 2026	
5	Workshop and open forum invitation in Tashkent	October 2026	
6	Summarizing online meeting	November 2026	
7	Completing the project, and prepare final report	December 2026	

8	Submit final report	*By the 15th of the month following the end of the second year of the project*	Final report *(if the project is completed)*

** In the project's calendar plan, the works to be performed must fully reflect the research form, scientific research results, and testing activities for the obtained results in accordance with the publication announcement. .*

*** Scientific research works to be performed within the project must be presented quarterly in a clear and sequential manner.*

**** Indicated sequentially from the month the project begins, in accordance with the signed contract.*

Plan of scientific research works to be performed in the 1st Year of the project

(Indicates the scientific research works to be performed within each stage of the first year of the project and their duration)

Scientific research works to be performed in the 1st Year of the project			January	February	March		April	May	June	July	August	September	October	November	December
Stages	Start (month)	Duration (months)													
1	January	3													
				Kick-off online meeting with Chinese research partners. Categorizing the research area and mission for each research team. And start to data acquisition, survey on the existing research and analyze.											
2	April	4													
				Analytical model analyzing and verification. Construct AI or DL NN model to apply simulation. Two types of model comparison, and complementation.											
3	June	5													
				Model completion and continue to amend. Integrating hierarchical models and verifying its usefulness. From the integrated model, start to scheduling design.											
4	September	4													
4				Workshop organization in Tashkent, and invited a Chinese research team. And deliver to communication with each research team outputs, and complement the research. Check the model verification via simulation.											
4	October	3													
				NN model completion, and verify its usefulness. Compare the result with an analytical model. And continually amend the model.											
5	November	2													
				Technical final reports for first year of the project and start writing jointly research articles for local and indexed in WoS and Scopus, SCI journals											

1	January	3													
				Kick-off online meeting with Chinese research partners. Categorizing the research area and mission for each research team. And start to data acquisition, survey on the existing research and analyze.											
2	April	4													