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ENGINEERING ASSESSMENT OF THE REALISM OF PRELIMINARY INVESTMENT COST ESTIMATES: THE CASE OF THE FERIK COMMUNITY MULTIFUNCTIONAL COMMUNITY CENTER

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Abstract

Public investment projects require realistic preliminary cost estimates to ensure effective planning, financing, and implementation. However, early-stage investment budgets are often prepared without a comprehensive engineering assessment, resulting in significant discrepancies between the proposed budget and the actual project cost.

The aim of this study is to develop an engineering approach for assessing the realism of preliminary investment cost estimates and to demonstrate its application through a case study of the proposed multifunctional community center in Ferik Community, Armavir Province, Republic of Armenia.

The research involved a comprehensive engineering assessment of all major project components, including design works, geotechnical investigations, structural systems, underground protective facilities, architectural works, building engineering systems, fire protection measures, external utilities, and site development. The evaluation was performed under theoretically most favorable engineering and construction conditions in order to determine the minimum realistic investment cost.

The results indicate that the proposed preliminary investment budget of AMD 80.0 million is insufficient to ensure complete project implementation. The engineering assessment estimated the theoretical minimum project cost at AMD 207.8 million (including VAT), while the practical investment cost, considering typical engineering and construction uncertainties, is expected to reach approximately AMD 270 million.

The study demonstrates that comprehensive engineering assessment should become an integral part of preliminary investment planning in order to improve financial realism, reduce implementation risks, and enhance the efficiency of public infrastructure investments.

***Keywords*:** public investment project; preliminary cost estimate; engineering assessment; financial realism; community infrastructure; multifunctional community center.

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Introduction

Public infrastructure investment projects are among the most important instruments for regional development, the improvement of community services, and the enhancement of the population's quality of life. The effectiveness of such projects depends not only on the quality of their technical solutions but also on the accuracy of preliminary investment cost estimation. Preliminary cost estimates constitute one of the fundamental starting points for project planning, financing, procurement procedures, and subsequent implementation. Therefore, their reliability has a direct influence on the overall feasibility and successful realization of investment projects.

In practice, preliminary investment costs are frequently established on the basis of limited initial information without a comprehensive engineering assessment. In many cases, only an overall financial framework is presented, without detailed justification based on architectural and structural solutions, engineering systems, fire protection measures, or external infrastructure components. As a result, the preliminary investment estimate may differ substantially from the actual financial resources required for project implementation, leading to project redesign, additional financing requirements, phased construction, or even project cancellation.

International experience demonstrates that the underestimation of preliminary costs represents a systemic challenge in infrastructure investment projects. The scientific literature has extensively documented the phenomena of *optimism bias* and *strategic misrepresentation*, both of which contribute to preliminary budgets that frequently fail to reflect actual project costs. At the same time, most existing studies focus primarily on cost overruns observed during project implementation or after project completion, whereas the methodology for comprehensive engineering assessment at the preliminary investment planning stage remains comparatively underexplored.

This issue is particularly significant for public community buildings, where preliminary investment cost estimation requires a comprehensive engineering approach. Such projects include not only the principal building structure but also numerous interrelated engineering systems, fire protection installations, external utility networks, site development works, and, where applicable, civil protection facilities designed in accordance with applicable safety requirements. The omission of any of these essential components may significantly compromise the financial realism of the proposed investment project.

The objective of this study is to perform an engineering assessment of the realism of preliminary investment cost estimates for public infrastructure projects and to propose a systematic evaluation approach based on the sequential assessment of all mandatory structural and engineering components included in the project scope. As a case study, the research examines the investment project for the construction of a multifunctional community center in Ferik Community, Armavir Province, Republic of Armenia. The study includes a comprehensive techno-economic assessment of the project's principal design, construction, and engineering components in order to determine its theoretical minimum realistic investment cost and to compare this value with the preliminary financial framework proposed for the project.

The findings of this research may contribute not only to the evaluation of the selected case study but also to the improvement of methodologies for preliminary investment cost estimation in public infrastructure projects, thereby enhancing the reliability of investment planning, strengthening the justification of financing decisions, and promoting the more efficient use of public financial resources.

Literature Review

The assessment of preliminary investment costs has become one of the major research areas in infrastructure project management and public investment planning over the past decades. The accuracy of preliminary cost estimates is widely recognized as a fundamental prerequisite for technical feasibility, sound financing decisions, and the successful implementation of public investment projects [1–6]. Both academic literature and professional practice emphasize that decisions made during the early stages of project development largely determine the overall investment framework, the quality of engineering solutions, and the efficiency of subsequent project execution [1,2,4].

A variety of methodologies have been developed for preliminary cost estimation, differing in terms of the amount of available information and the expected level of estimation accuracy. The most widely adopted approaches include conceptual, analogous, parametric, elemental, and detailed engineering estimating methods [1,2]. The AACE International Cost Estimate Classification System categorizes estimates according to the maturity of project definition and the completeness of available information, emphasizing that estimates prepared during the early project stages inherently involve significant uncertainty and therefore require appropriate contingency allowances [3]. Similar principles are incorporated into the PMBOK® Guide and ISO 21502, where cost estimation is considered an integral component of project planning and is closely linked to risk management, decision-making, and project governance [4–6].

Preliminary cost estimation is also closely associated with the economic appraisal of public investment projects. International guidelines, including HM Treasury's *Green Book*, the European Commission's *Guide to Cost–Benefit Analysis of Investment Projects*, and OECD recommendations, emphasize the importance of reliable financial estimates, cost–benefit analysis, and the efficient allocation of public resources during investment planning [9–12]. Nevertheless, these methodologies primarily focus on economic appraisal and financial evaluation while paying comparatively limited attention to the engineering completeness of the proposed project as a prerequisite for realistic cost estimation.

A substantial body of research has investigated the causes of cost overruns in infrastructure projects. The pioneering studies of Flyvbjerg and co-authors demonstrated that the underestimation of project costs is not merely the consequence of technical uncertainty but also results from systematic phenomena such as *optimism bias* and *strategic misrepresentation* [13–15]. Their findings indicate that preliminary budgets are frequently based on overly optimistic assumptions, resulting in significant cost overruns, additional financing requirements, and schedule delays during project implementation [13–15].

More recently, increasing attention has been devoted to the Reference Class Forecasting methodology, which seeks to improve forecasting accuracy by comparing

proposed projects with statistically relevant historical project data [16]. This approach substantially reduces subjective bias and enhances the reliability of investment forecasts. However, it remains primarily based on historical comparisons and does not evaluate whether the engineering scope of the proposed project itself is complete and sufficiently defined before estimating its cost.

The reviewed literature indicates that existing methodologies mainly address three major issues: preliminary cost estimation, financial risk assessment, and the prediction of cost overruns [1–16]. However, very limited attention has been given to systematic approaches that evaluate the engineering completeness of an investment project before determining its preliminary cost. In particular, current methodologies rarely examine whether all mandatory architectural, structural, engineering, fire protection, external infrastructure, and supporting components required for project implementation have been properly identified and incorporated into the proposed investment budget. In practice, omissions at this stage frequently become one of the principal causes of unrealistic preliminary investment estimates.

The present study addresses this research gap by proposing a new methodological framework entitled **Engineering Completeness-Based Investment Assessment (ECIA)**. The proposed framework is founded on the principle that the realism of a preliminary investment cost estimate can only be ensured after systematically verifying the engineering completeness of the project. ECIA introduces a structured procedure for identifying and evaluating all mandatory structural, architectural, engineering, and supporting project components prior to cost estimation. This approach enables the determination of the theoretical minimum realistic investment cost, facilitates the identification of deficiencies in preliminary investment estimates, and contributes to more reliable public investment planning and decision-making.

Materials and Methods

Research Design

This research employs an engineering-based case study methodology to evaluate the realism of preliminary investment cost estimates for public infrastructure projects. The study combines qualitative engineering analysis with quantitative cost assessment in order to examine whether the proposed investment budget adequately reflects the complete engineering scope of the project.

Unlike conventional studies that investigate cost overruns after project implementation, the present research focuses on the earliest stage of the investment cycle, where the preliminary project budget is initially established and investment decisions are made. The proposed methodology therefore evaluates not only the monetary value of the investment estimate but also the engineering completeness of the project before construction begins.

The research is based on a single case study involving the proposed Multifunctional Community Center of Ferik Community, Armavir Province, Republic of Armenia. The project was selected because it represents a typical public investment project incorporating architectural, structural, mechanical, electrical, plumbing, fire protection, external infrastructure, landscaping, and civil protection components within a single integrated facility.

Such complexity provides an appropriate basis for evaluating the completeness and realism of preliminary investment estimates.

Engineering Completeness-Based Investment Assessment (ECIA)

The principal methodological contribution of this research is the development of the **Engineering Completeness-Based Investment Assessment (ECIA)** framework.

The ECIA methodology is based on the assumption that a preliminary investment estimate cannot be considered realistic unless every mandatory engineering component required for complete project implementation has first been identified and evaluated. Consequently, engineering completeness is regarded as a prerequisite for financial realism.

The proposed framework consists of four consecutive stages.

Stage 1. Project decomposition

The investment project is systematically decomposed into all mandatory engineering, construction, and supporting components required for implementation. Each component is considered an independent assessment unit.

Stage 2. Engineering completeness assessment

Each project component is examined to determine whether it has been included in the investment programme. The assessment covers, as applicable:

- engineering investigations;
- architectural design;
- structural design;
- electrical systems;
- heating, ventilation and air-conditioning systems;
- water supply and sewerage systems;
- fire protection systems;
- external utility networks;
- civil protection facilities;
- construction works;
- site development and landscaping;
- technical equipment and commissioning activities.

If one or more mandatory components are absent, the investment programme is considered engineeringly incomplete.

Stage 3. Component-based cost assessment

Every identified component is independently evaluated using engineering judgement, current construction practice, applicable technical standards, and realistic market-based construction costs. The objective is to determine the minimum technically feasible investment required for complete implementation of each project component.

Stage 4. Investment realism assessment

The theoretical minimum realistic investment cost is calculated as:

$$CTR = \sum C_i (i = 1 \dots n)$$

where: CTR – theoretical minimum realistic investment cost; C_i – estimated cost of the i-th mandatory project component; n – total number of mandatory project components included in the assessment.

Data Sources

The assessment was based on:

- the publicly available investment concept and project documentation;
- applicable Armenian construction regulations and technical standards;
- engineering design requirements for public buildings;
- current construction practice;
- engineering expert judgement regarding mandatory project components;
- realistic construction cost estimates under favourable implementation conditions.

No statistical forecasting or historical regression models were applied, since the objective of the study is to evaluate engineering completeness rather than predict future construction costs.

Assessment Procedure

The ECIA methodology was implemented according to the following sequence:

1. Review of the investment concept and identification of the proposed project scope.
2. Decomposition of the project into mandatory engineering and construction components.
3. Verification of the engineering completeness of the investment programme.
4. Independent engineering assessment of each mandatory project component.
5. Determination of the theoretical minimum realistic investment cost.
6. Comparison between the calculated investment value and the proposed preliminary investment budget.
7. Interpretation of the identified differences and evaluation of their implications for public investment planning.

Research Assumptions

To ensure consistency of assessment, the following assumptions were adopted:

- favourable geotechnical conditions;
- readily available utility connections;
- favourable construction logistics;
- technically compliant but economically efficient engineering solutions;
- market-based construction prices representative of normal implementation conditions.

These assumptions represent the most favourable realistic implementation scenario and therefore establish the minimum investment level required for complete project implementation.

Research Limitations

The ECIA methodology evaluates the realism of preliminary investment estimates from an engineering perspective. It does not assess procurement procedures, contractor performance, inflation, market volatility, contractual disputes, or construction-phase risks.

Accordingly, the calculated value should not be interpreted as the expected contract price. Instead, it represents the **theoretical minimum realistic investment cost** required to implement a technically complete project. This value serves as an engineering benchmark against which the adequacy of preliminary investment estimates can be objectively evaluated.

Conflict Setting

The preliminary estimation of public investment costs represents one of the most critical stages of investment planning, as it forms the basis for fundamental decisions regarding

project financing, design, procurement, and implementation. In practice, however, preliminary investment estimates are frequently developed using limited technical information and are often presented as aggregate financial values without a systematic assessment of the engineering completeness of the proposed project.

The existing scientific literature primarily focuses on cost overruns, forecasting inaccuracies, and the factors contributing to budget deviations observed during or after project implementation. Although these studies have substantially improved the understanding of project risk and cost management, they mainly address problems identified during project execution rather than the fundamental issue that exists at the earliest stage of investment decision-making.

The central conflict addressed in this research arises from the fact that the financial realism of preliminary investment estimates is commonly evaluated without first determining whether all mandatory architectural, structural, engineering, fire protection, external infrastructure, and supporting components required for complete project implementation have been identified and incorporated into the investment programme. Consequently, even a financially well-justified estimate may fail to represent the actual investment requirements if the engineering scope of the project is incomplete.

This contradiction is particularly evident in multifunctional public buildings, where numerous interrelated engineering systems must operate as a single integrated facility. The omission or inadequate consideration of any mandatory project component may lead to substantial underestimation of the preliminary investment cost and subsequently generate additional design revisions, financing requirements, and implementation challenges.

The present study addresses this research conflict by proposing the **Engineering Completeness-Based Investment Assessment (ECIA)** framework. The proposed methodology is founded on the principle that the engineering completeness of an investment project should be systematically verified before evaluating the realism of its preliminary investment cost. This approach makes it possible to distinguish genuine financial insufficiency from deficiencies in the engineering scope of the project and provides a more objective and technically justified basis for assessing the realism of preliminary investment estimates in public infrastructure projects.

Research Results

Characteristics of the Case Study Project

The case study selected for this research is the investment project for the construction of the Multifunctional Community Center in Ferik Community, Armavir Province, Republic of Armenia. The project involves the construction of a single-storey public building intended to provide administrative, cultural, educational, social, and civil protection services for the local community.

The proposed facility includes administrative offices, a multifunctional hall with a stage, a library, youth and educational spaces, a medical room, technical service rooms, sanitary facilities, and an underground multifunctional civil protection shelter designed in accordance with the applicable civil protection requirements. In addition to the building itself,

the investment project includes external engineering utility networks, site development works, and all supporting systems necessary for the complete operation of the facility.

According to the published investment proposal, the preliminary investment cost of the project is AMD 80.0 million**.** However, the available documentation does not provide a detailed engineering justification for the proposed investment estimate or a breakdown of the costs associated with individual project components. Consequently, it is not possible to determine whether the proposed financial framework is sufficient to ensure the complete implementation of the project.

These characteristics make the Ferik Multifunctional Community Center an appropriate case study for applying the proposed **Engineering Completeness-Based Investment Assessment (ECIA)** framework. The project's multidisciplinary engineering structure provides an opportunity to evaluate how engineering completeness influences the realism of preliminary investment estimates and to demonstrate the extent to which a systematic engineering assessment can improve the reliability of public investment planning and decision-making.

Engineering Completeness Assessment

The first stage of the ECIA methodology consisted of evaluating the engineering completeness of the investment project. The objective of this assessment was to determine whether the investment programme included all mandatory components required for the complete design, construction, and operation of the proposed facility.

For this purpose, the investment project was systematically decomposed into individual structural, engineering, and supporting components. The presence of each component was evaluated in accordance with applicable construction regulations, engineering design requirements, and generally accepted professional practice for the design and construction of public buildings.

The assessment identified the following principal project components:

- engineering geological and geodetic investigations;
- architectural design;
- structural design;
- external and internal electrical systems;
- heating, ventilation, and air-conditioning (HVAC) systems;
- internal and external water supply and sewerage systems;
- fire protection systems;
- underground multifunctional civil protection shelter;
- construction works;
- site development and landscaping;
- technical equipment and supporting systems;
- preparation of cost estimates and technical specifications;
- printing and submission of project documentation.

The assessment demonstrated that the complete implementation of the project requires a considerable number of interrelated design, construction, and engineering activities, each representing an independent technical and financial component of the overall investment

programme. Consequently, the realism of the preliminary investment estimate can only be evaluated when all mandatory project components are considered simultaneously.

Within the ECIA framework, each identified component was treated as an independent contributor to the total investment cost. This approach makes it possible not only to evaluate the overall financial requirements of the project but also to identify those components whose omission or underestimation may substantially affect the realism of the preliminary investment estimate.

The results of the engineering completeness assessment are summarized in Tab. 1**,** which presents all mandatory design, construction, engineering, and supporting components included in the ECIA evaluation.

Table 1

Mandatory Design, Construction, and Engineering Components Identified within the ECIA Framework

No.	Component	No.	Component	No.	Component
1	Engineering geological investigations	15	Printing and submission of project documentation	29	Sanitary fixtures and plumbing equipment
2	Geodetic investigations	16	Site preparation works	30	Installation of the heating system
3	Architectural design	17	Earthworks	31	Installation of the ventilation system
4	Structural design	18	Construction of the underground civil protection shelter	32	Internal electrical installation works
5	External electrical system design	19	Foundations and foundation structure	33	Installation of internal water supply and sewerage systems
6	Internal electrical system design	20	Structural framework	34	Installation of the automatic sprinkler fire protection system
7	Heating system design	21	External walls	35	Automatic fire detection and alarm system
8	Ventilation system design	22	Roof construction	36	Smoke extraction system (civil protection shelter)
9	Water supply and sewerage system design	23	External doors and windows	37	External site lighting
10	Fire protection system design	24	Internal partition walls	38	Septic tank construction
11	Civil protection shelter design	25	Internal doors	39	Site development and landscaping
12	Site development and landscaping design	26	Floor construction and finishing	40	Perimeter fencing and entrance gate
13	Preparation of cost estimates and technical specifications	27	Ceiling finishing works		
14	Preparation of project documentation	28	Internal finishing works		

Component-Based Investment Cost Assessment

Following the engineering completeness assessment, the second stage of the ECIA methodology involved the cost assessment of all mandatory project components. Each component was evaluated independently, taking into account its technical complexity, scope

of work, applicable regulatory requirements, current construction practices, and realistic market-based construction costs in the Republic of Armenia.

To ensure the consistency and comparability of the assessment, all calculations were performed under the same fundamental assumptions. The analysis assumed the most favorable realistic implementation conditions, including favorable geotechnical conditions, readily available utility connections, the absence of major technical constraints, and the application of technically compliant and economically efficient engineering solutions.

Under these assumptions, the objective was not to estimate the probable market value of the project, but rather to determine its **theoretical minimum realistic investment cost**, representing the minimum financial resources required to implement a technically complete project.

Particular attention was devoted to project components that are frequently omitted or insufficiently considered during the preliminary estimation stage of public investment projects. These include the underground civil protection shelter, ventilation and smoke extraction systems, fire protection systems, external engineering infrastructure, site development and landscaping works, as well as the complete preparation of design documentation, cost estimates, and technical specifications.

The estimated costs of all mandatory project components are presented in Tab. 2**.** The sum of these component costs was used to determine the theoretical minimum realistic investment cost of the project, which subsequently served as the basis for the comparative analysis presented in the following section.

Table 2

Estimated Costs of Mandatory Project Components

No.	Project Component	Cost (AMD million)	No.	Project Component	Cost (AMD million)	No.	Project Component	Cost (AMD million)
1	Engineering investigations		6	External walls, roof, doors and windows		11	Electrical systems	
2	Design services (all disciplines)	**3.2**	7	Internal partitions and finishing works		12	Fire protection systems	
3	Site preparation and earthworks		8	Heating system		13	External engineering infrastructure	
4	Underground civil protection shelter		9	Ventilation and smoke extraction systems		14	Site development and landscaping	
5	Foundations and structural framework		10	Water supply and sewerage systems		15	Perimeter fencing and entrance gate	
Total	**Theoretical minimum realistic investment cost**	**207.8**						

Comparative Analysis of the Preliminary Investment Estimate and the ECIA Assessment

The application of the ECIA methodology determined that the **theoretical minimum realistic investment cost** for the construction of the Multifunctional Community Center in Ferik Community is AMD 207.8 million**.** This value represents the minimum financial requirement necessary to implement a technically complete project incorporating all mandatory design, construction, engineering, and supporting components.

For comparison, the published preliminary investment estimate for the project amounts to **AMD 80.0 million**, which is substantially lower than the value obtained through the ECIA assessment. The difference between the two estimates is **AMD 127.8 million**, indicating that the ECIA-based estimate is approximately 2.6 times higher than the proposed preliminary investment budget.

It should be emphasized that the **AMD 207.8 million** obtained through the ECIA methodology does **not** represent the expected contract value or the final construction cost of the project. Instead, it represents the **theoretical minimum realistic investment cost** under the most favorable implementation conditions, assuming a technically complete project and economically efficient engineering solutions that fully comply with applicable technical requirements. Under actual construction conditions, factors such as site-specific characteristics, market fluctuations, inflation, logistical constraints, and other project-specific uncertainties may result in higher implementation costs.

These findings demonstrate that, even under the most favorable engineering and economic assumptions, the published preliminary investment estimate is insufficient to ensure the complete implementation of the project. Therefore, the observed discrepancy cannot be attributed solely to market price variations or normal estimation uncertainty but rather reflects a substantial inconsistency between the preliminary investment estimate and the actual engineering requirements of the proposed project.

The comparative results of the published preliminary investment estimate and the ECIA assessment are presented in Tab. 3**.**

Table 3.

Comparison of the Preliminary Investment Estimate and the ECIA Assessment

Indicator	Value
Published preliminary investment estimate	AMD 80.0 million
ECIA-based theoretical minimum realistic investment cost	AMD 207.8 million
Absolute difference	AMD 127.8 million
Ratio (ECIA / preliminary estimate)	2.60
Difference (%)	159.8%

Engineering Interpretation of the Results

The results of the ECIA assessment demonstrate that the realism of a preliminary investment estimate depends not only on the accuracy of cost calculations but, more fundamentally, on the completeness of the engineering scope considered during project planning. The comparative analysis indicates that the published preliminary investment

estimate does not adequately reflect the full range of mandatory design, construction, engineering, and supporting components required for the implementation of the proposed facility.

The identified discrepancy should not be interpreted merely as a numerical difference between two investment values. Rather, it reflects a structural inconsistency between the engineering requirements of the project and the financial framework established during the preliminary planning stage. Consequently, the principal source of the discrepancy is associated with the omission or insufficient consideration of mandatory project components rather than with ordinary uncertainty in construction pricing.

The application of the ECIA methodology demonstrates that evaluating engineering completeness before estimating investment costs provides a more objective basis for assessing the realism of preliminary investment programmes. By systematically identifying all mandatory project components, the methodology enables the recognition of potential deficiencies at the earliest stage of project development, thereby reducing the likelihood of substantial budget revisions during subsequent design and construction phases.

The findings further indicate that preliminary investment estimates should not be regarded solely as financial indicators. Instead, they should be considered engineering-based planning instruments whose reliability depends on the completeness of the underlying project definition. From this perspective, engineering completeness constitutes a prerequisite for financial realism rather than a consequence of cost estimation.

The Ferik Community case study demonstrates the practical applicability of the ECIA framework for evaluating public investment projects at the planning stage. Although the numerical results presented in this study are specific to the selected case, the proposed methodology is transferable to other public infrastructure projects where the completeness of the engineering scope directly influences the realism of preliminary investment estimates.

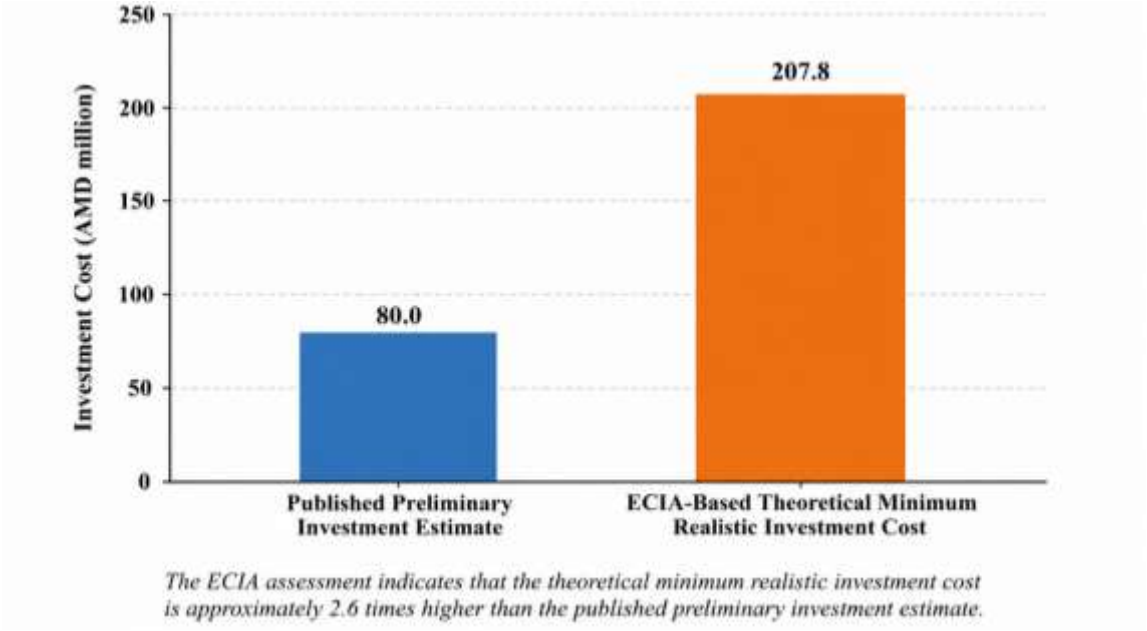

Fig. 1 Comparison of the Preliminary Investment Estimate and the ECIA-Based Investment Assessment
Published Preliminary Investment Estimate — 80.0 mln ADM
ECIA-Based Theoretical Minimum Realistic Investment Cost — 207.8 mln ADM

Discussion

The findings of the present study demonstrate that the realism of preliminary investment estimates for public infrastructure projects cannot be evaluated solely through financial calculations. The results indicate that the reliability of a preliminary investment estimate primarily depends on the engineering completeness of the proposed project, since the omission of even a single mandatory component may substantially compromise the credibility of the overall investment assessment.

The obtained results are consistent with previous studies reporting that cost overruns and budget deviations in infrastructure projects are frequently associated not only with changes in construction costs but also with inadequate project definition and incomplete planning during the early stages of project development [13–16]. However, the present research further demonstrates that one of the principal sources of unrealistic preliminary investment estimates may arise even before financial calculations are performed, namely when the mandatory engineering components required for complete project implementation have not been systematically identified.

Existing international methodologies, including the AACE International Cost Estimate Classification System, the PMBOK® Guide, and ISO 21502, place considerable emphasis on project definition maturity, risk management, and the accuracy of cost estimation [3–7]. Nevertheless, these approaches do not provide a systematic procedure for verifying the engineering completeness of an investment project prior to financial evaluation. In this respect, the proposed ECIA methodology complements existing practices by introducing a structured framework for assessing engineering completeness before preliminary investment costs are determined.

The case study of the Ferik Multifunctional Community Center demonstrates that, even under the most favorable implementation conditions, the theoretical minimum realistic investment cost substantially exceeds the published preliminary investment estimate. This finding indicates that the assessment of preliminary investment estimates should place primary emphasis not only on financial calculations but also on the structural and engineering completeness of the proposed project.

The proposed ECIA methodology is not limited to multifunctional community centers and may be applied to a broad range of public infrastructure projects, including educational, healthcare, administrative, cultural, and other public facilities. Its application can facilitate the early identification of structural deficiencies in investment programmes, improve the reliability of preliminary investment estimates, and reduce the need for subsequent design revisions and additional project financing.

Conclusions

1. The study demonstrates that the realism of preliminary investment estimates for public infrastructure projects depends not only on the accuracy of financial calculations but, more fundamentally, on the engineering completeness of the proposed project.
2. The case study of the Ferik Multifunctional Community Center shows that the published preliminary investment estimate does not adequately reflect the complete engineering scope required for project implementation. Under the assumptions adopted in this study,

the ECIA assessment determined a theoretical minimum realistic investment cost of AMD 207.8 million**,** substantially exceeding the published preliminary investment estimate of AMD 80.0 million**.**

3. The identified discrepancy indicates that unrealistic preliminary investment estimates may result not only from market uncertainty or construction cost fluctuations but also from the omission or insufficient consideration of mandatory project components during the investment planning stage.
4. The proposed Engineering Completeness-Based Investment Assessment (ECIA) framework introduces a systematic engineering approach that evaluates project completeness before financial assessment. This methodology complements existing cost estimation practices by incorporating engineering completeness as a prerequisite for realistic investment planning.
5. The ECIA methodology provides a practical decision-support tool for public investment planning by enabling the early identification of missing project components, improving the reliability of preliminary investment estimates, and reducing the likelihood of substantial cost revisions during subsequent project development.
6. Although the numerical results presented in this study are specific to the selected case study, the proposed methodology is applicable to a broad range of public infrastructure projects and may contribute to improving the technical and financial quality of preliminary investment planning.

References

1. Flanagan R, Jewell C. *New Code of Estimating Practice*. 7th ed. Chichester: Wiley-Blackwell; 2018.
2. Ashworth A, Perera S. *Cost Studies of Buildings*. 6th ed. London: Routledge; 2015.
3. AACE International. *Professional Guidance Document No. 01: Guide to Cost Estimate Classification Systems*. Morgantown (WV): AACE International; 2022.
4. Project Management Institute. *A Guide to the Project Management Body of Knowledge (PMBOK® Guide).* 7th ed. Newtown Square (PA): Project Management Institute; 2021.
5. International Organization for Standardization. **ISO 21502:2020**. *Project, Programme and Portfolio Management—Guidance on Project Management*. Geneva: ISO; 2020.
6. International Organization for Standardization. **ISO 31000:2018**. *Risk Management—Guidelines*. Geneva: ISO; 2018.
7. Hollar DA, Rasdorf W, Liu M, Hummer JE, Arocho I, Hsiang SM. Preliminary Engineering Cost Estimation Model for Bridge Projects. *Journal of Construction Engineering and Management*. 2013;139(9):1259–1267. doi:10.1061/(ASCE)CO.1943-7862.0000668.
8. Remer DS, Buchanan HR. Estimating the Cost for Doing a Cost Estimate. *International Journal of Production Economics*. 1999;58(1):9–22.
9. HM Treasury. *The Green Book: Central Government Guidance on Appraisal and Evaluation*. London: HM Treasury; 2022.

10. European Commission. *Guide to Cost–Benefit Analysis of Investment Projects: Economic Appraisal Tool for Cohesion Policy 2021–2027*. Luxembourg: Publications Office of the European Union; 2021.
11. OECD. *Cost–Benefit Analysis and the Environment: Further Developments and Policy Use*. Paris: OECD Publishing; 2018.
12. Boardman AE, Greenberg DH, Vining AR, Weimer DL. *Cost–Benefit Analysis: Concepts and Practice*. 5th ed. Cambridge: Cambridge University Press; 2021.
13. Flyvbjerg B, Holm MS, Buhl SL. Underestimating Costs in Public Works Projects: Error or Lie? *Journal of the American Planning Association*. 2002;68(3):279–295. doi:10.1080/01944360208976273.
14. Flyvbjerg B. Policy and Planning for Large Infrastructure Projects: Problems, Causes, Cures. *Environment and Planning B: Planning and Design*. 2007;34(4):578–597.
15. Flyvbjerg B, Ansar A, Budzier A, et al. Five Things You Should Know About Cost Overrun. *Transportation Research Part A: Policy and Practice*. 2018;118:174–190. doi:10.1016/j.tra.2018.07.013.
16. Batselier J, Vanhoucke M. Practical Application and Empirical Evaluation of Reference Class Forecasting for Project Management. *Project Management Journal*. 2016;47(5):36–51.

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Է.Յու. Գալստյան
Ակադեմիկոս Ի.Վ. Եղիազարովի անվան ջրային հիմնահարցերի և հիդրոտեխնիկայի ինստիտուտ

Հանրային ներդրումային ծրագրերի նախնական արժեքի գնահատումը հանդիսանում է ծրագրերի պլանավորման և ֆինանսավորման հիմնարար փուլերից մեկը, քանի որ այն ուղղակիորեն ազդում է ծրագրերի իրագործելիության, բյուջետային պլանավորման և հետագա իրականացման արդյունավետության վրա: Սակայն նախնական արժեքի ձևավորման գործընթացում հաճախ բացակայում է ինժեներական ամբողջական գնահատման մեթոդաբանությունը, որի հետևանքով ներդրումային ծրագրերում ներկայացվող ֆինանսական շրջանակները կարող են էականորեն տարբերվել ծրագրի իրական արժեքից:

Ուսումնասիրության նպատակն է մշակել ներդրումային ծրագրերի նախնական արժեքի իրատեսականության ինժեներական գնահատման մոտեցում և այն կիրառել որպես դեպքի ուսումնասիրություն՝ ՀՀ Արմավիրի մարզի Ֆերիկ համայնքի բազմաֆունկցիոնալ համայնքային կենտրոնի ներդրումային ծրագրի օրինակով:

Հետազոտության ընթացքում իրականացվել է նախագծով նախատեսված բոլոր շինարարական և ինժեներական աշխատանքների փուլային տեխնիկատնտեսական գնահատում՝ ներառյալ նախագծային աշխատանքները, երկրաբանական

հետազոտությունները, կրող կառուցվածքները, ստորգետնյա պաշտպանական տարածքը, ճարտարապետական և ինժեներական համակարգերը, հակահրդեհային միջոցառումները, արտաքին ենթակառուցվածքները և տարածքի բարեկարգումը: Գնահատումը կատարվել է առավել բարենպաստ նախագծային և շինարարական պայմանների ընդունմամբ՝ նպատակ ունենալով որոշել ծրագրի տեսական նվազագույն իրատեսական արժեքը:

Արդյունքները ցույց տվեցին, որ ներկայացված 80.0 մլն դրամ նախնական ֆինանսական շրջանակը չի համապատասխանում ծրագրի իրական ծավալներին: Իրականացված ինժեներական գնահատմամբ ծրագրի տեսական նվազագույն արժեքը կազմել է 207.8 մլն դրամ (ԱԱՀ-ով), մինչդեռ գործնական պայմաններում, հաշվի առնելով նախագծման և շինարարության բնական ռիսկերը, իրական ներդրումային արժեքը կարող է կազմել շուրջ 270 մլն դրամ:

Ուսումնասիրությունը ցույց է տալիս, որ ներդրումային ծրագրերի նախնական արժեքի գնահատման գործընթացում անհրաժեշտ է կիրառել ինժեներական ամբողջական մոտեցում, որը հնարավորություն կտա նախքան ֆինանսավորման հաստատումը գնահատել ծրագրերի ֆինանսական իրատեսականությունը և նվազեցնել հետագա բյուջետային, տեխնիկական և կազմակերպական ռիսկերը:

Բանալի բառեր՝ ներդրումային ծրագիր, նախնական արժեք, ինժեներական գնահատում, ֆինանսական իրատեսականություն, համայնքային ենթակառուցվածք, բազմաֆունկցիոնալ համայնքային կենտրոն:

ИНЖЕНЕРНАЯ ОЦЕНКА РЕАЛИСТИЧНОСТИ ПРЕДВАРИТЕЛЬНОЙ СТОИМОСТИ ИНВЕСТИЦИОННЫХ ПРОЕКТОВ: НА ПРИМЕРЕ МНОГОФУНКЦИОНАЛЬНОГО ОБЩЕСТВЕННОГО ЦЕНТРА ОБЩИНЫ ФЕРИК

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Предварительная оценка стоимости государственных инвестиционных проектов является одним из ключевых этапов их планирования и финансирования, поскольку непосредственно влияет на реализуемость проекта, бюджетное планирование и эффективность последующей реализации. Однако на практике предварительные бюджеты нередко формируются без комплексной инженерной оценки, что приводит к существенным расхождениям между заявленной стоимостью проекта и его фактической стоимостью.

Целью настоящего исследования является разработка инженерного подхода к оценке реалистичности предварительной стоимости инвестиционных проектов и его апробация на примере инвестиционного проекта строительства многофункционального общественного центра общины Ферик Армавирской области Республики Армения.

E.Yu. Galstyan

ENGINEERING ASSESSMENT OF THE REALISM OF PRELIMINARY INVESTMENT COST ESTIMATES: THE CASE OF THE FERIK COMMUNITY MULTIFUNCTIONAL COMMUNITY CENTER

В ходе исследования выполнена комплексная инженерная оценка всех основных составляющих проекта, включая проектные работы, инженерно-геологические изыскания, несущие конструкции, подземное защитное сооружение, архитектурные решения, инженерные системы здания, противопожарные мероприятия, наружные инженерные сети и благоустройство территории. Оценка проводилась при наиболее благоприятных проектных и строительных условиях с целью определения теоретически минимальной реалистичной стоимости проекта.

Результаты исследования показали, что заявленная предварительная стоимость проекта в размере 80,0 млн драмов не соответствует фактическому объему предусмотренных работ. Согласно выполненной инженерной оценке, теоретически минимальная стоимость реализации проекта составляет 207,8 млн драмов (с учетом НДС), тогда как практическая стоимость строительства с учетом типичных инженерных и строительных рисков может достигать около 270 млн драмов.

Полученные результаты свидетельствуют о необходимости внедрения комплексной инженерной оценки на стадии предварительного формирования инвестиционных программ, что позволит повысить реалистичность финансового планирования, снизить риски реализации проектов и повысить эффективность государственных инфраструктурных инвестиций.

***Ключевые слова*:** инвестиционный проект; предварительная стоимость; инженерная оценка; финансовая реалистичность; общественная инфраструктура; многофункциональный общественный центр.

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