



## **Global Conference on Multidisciplinary Research and Innovation**

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### **EFFICIENCY CRITERIA FOR APPLYING ARTIFICIAL INTELLIGENCE TO THE ECONOMIC MANAGEMENT OF EDUCATIONAL INSTITUTIONS**

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#### **Abstract**

The paper addresses the problem of assessing the efficiency of applying artificial intelligence (AI) technologies to the economic management of educational institutions. Global trends in AI adoption and cost, as well as students' assessment of AI integration, are analysed. A multi-level assessment system comprising economic, operational, educational, human-capital and risk-management criteria is proposed, together with a methodology for calculating an integral efficiency index, and its application is demonstrated on an illustrative example.

**Keywords:** Artificial intelligence, efficiency criteria, integral index, economic management, ROI, normalisation, weighted assessment, educational institution, AI literacy.

#### **INTRODUCTION**

The use of AI in organisations has accelerated sharply in recent years. According to Stanford University's AI Index 2025 report, 78% of organisations used AI in 2024, up from 55% a year earlier [1]. At the same time, the cost of the technology has fallen dramatically: the inference cost of a system performing at the level of



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GPT-3.5 dropped more than 280-fold between November 2022 and October 2024 [1]. As a result, the question “can we implement AI?” is being replaced by the question “how efficient is it?”.

In educational institutions this question is especially difficult to answer, because the impact of AI shows up not only in financial indicators but also in the quality of education, staff workload and the level of risk. Moreover, if users are poorly prepared, even the most expensive system will not deliver the expected results. Developing a **methodology for assessing AI efficiency on the basis of comprehensive criteria** is therefore a pressing task.

The aim of the study is to develop a system of criteria and an integral assessment methodology for the efficiency of applying AI to the economic management of educational institutions.

### MAIN PART

The efficiency of AI projects often depends less on the technology than on the readiness of users. The results of a survey conducted by the Digital Education Council in 16 countries reveal serious gaps in this respect (Figure 1): 58% of students reported that they lack sufficient AI knowledge and skills, 48% feel unprepared for an AI-driven workforce, and 80% said that AI integration at their university falls short of expectations [2]. Human capital should therefore be singled out as a separate criterion in the efficiency assessment system.



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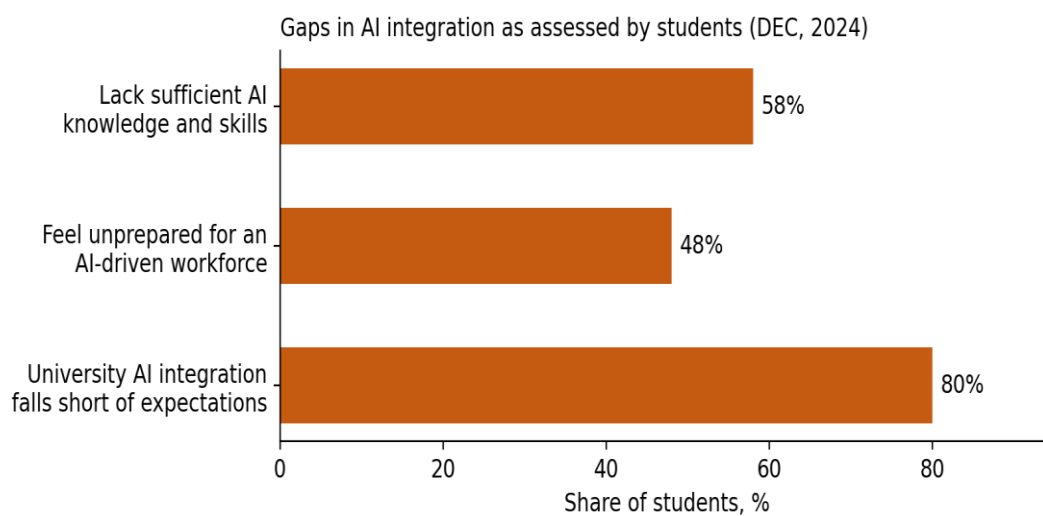


**Figure 1. Gaps in AI integration as assessed by students, 2024**

Source: compiled by the author based on the Digital Education Council Global AI Student Survey [2].

The proposed system consists of five criteria and their indicators (Table 1). In selecting the criteria, the economic (resource use and results), functional (speed and quality of processes), social (learning outcomes and human capital) and security aspects of efficiency were taken into account; the approach draws on the Balanced Scorecard [4] and OECD recommendations on the effectiveness of the digital education ecosystem [5].



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**Table 1 Criteria and indicators of the efficiency of applying AI to economic management**

| Criterion (weight)                      | Indicators                                                                                       | Calculation formula                                         | Data source                      |
|-----------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------|----------------------------------|
| K <sub>1</sub> . Economic (0.30)        | Return on investment (ROI); relative cost savings; net present value (NPV)                       | $ROI = (Benefit - Cost) / Cost \cdot 100\%$                 | Accounting and project reports   |
| K <sub>2</sub> . Operational (0.20)     | Reduction in process time; error rate; share of automated operations                             | $\Delta T = (T_0 - T_1) / T_0$                              | Information system log files     |
| K <sub>3</sub> . Educational (0.20)     | Academic performance; student retention rate                                                     | $R = \text{continuing students} / \text{admitted students}$ | HEMIS                            |
| K <sub>4</sub> . Human capital (0.15)   | Level of AI literacy; share of active staff and student users                                    | $U = \text{active users} / \text{total users}$              | Surveys, platform statistics     |
| K <sub>5</sub> . Risk management (0.15) | Number of data security incidents; complaints about algorithmic decisions; regulatory compliance | $S = 1 - \text{incidents} / \text{maximum permissible}$     | Internal audit, security service |

Source: developed by the author.

The hierarchical structure of the criteria and indicators is shown in Figure 2. Each indicator is expressed in the range 0–1 using the normalisation formula  $K_i = (x_i - x_{\min}) / (x_{\max} - x_{\min})$ . Criterion weights are determined by expert assessment (for example, the Analytic Hierarchy Process, AHP [3]); the weights recommended in the table give priority to economic impact from the standpoint of economic management.



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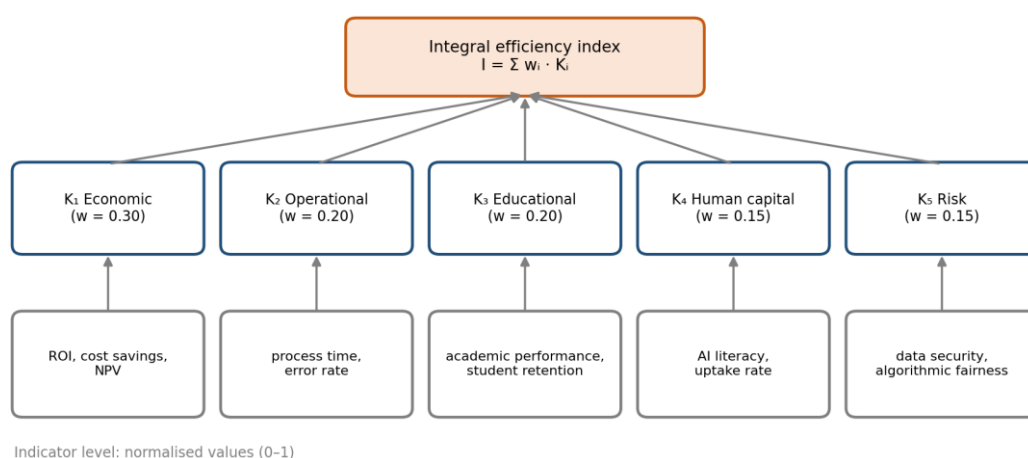


**Figure 2. Hierarchical structure of the criteria for assessing AI efficiency**

Source: developed by the author.

The integral efficiency index is calculated as  $I = \sum w_i \cdot K_i$ , where  $w_i$  is the weight of criterion  $i$  ( $\sum w_i = 1$ ) and  $K_i$  is the normalised value of the criterion. The scale for interpreting the index is given in Table 2.

**Table 2 Scale for interpreting the integral efficiency index**

| Index value | Efficiency level | Management recommendation                                |
|-------------|------------------|----------------------------------------------------------|
| 0.00 – 0.40 | Low              | Revise or discontinue the project                        |
| 0.41 – 0.60 | Medium           | Take corrective action on weak criteria                  |
| 0.61 – 0.80 | High             | Extend the project to other units                        |
| 0.81 – 1.00 | Very high        | Recommend the practice to other educational institutions |

Source: developed by the author.



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The application of the methodology is shown on an illustrative example (Figure 3). Suppose that before AI implementation the criterion values for an HEI are 0.62, 0.71, 0.48, 0.40 and 0.35 respectively. Then  $I = 0.30 \cdot 0.62 + 0.20 \cdot 0.71 + 0.20 \cdot 0.48 + 0.15 \cdot 0.40 + 0.15 \cdot 0.35 \approx 0.54$  (medium level). If after AI implementation the values rise to 0.78, 0.82, 0.66, 0.61 and 0.58, the index increases to 0.71 (high level). The example shows that the human capital and risk management criteria have the lowest values and are the factors limiting the integral result.

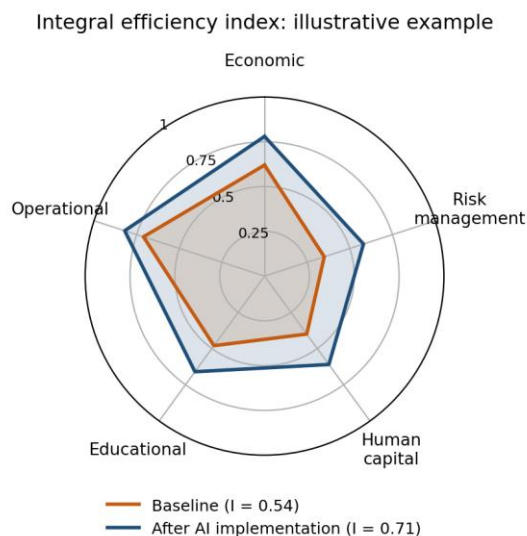


**Figure 3. Calculation of the integral efficiency index: illustrative example**  
Source: author's calculation (hypothetical data).

## CONCLUSION AND RECOMMENDATIONS

As AI becomes cheaper and more widely used, the main issue for educational institutions is not owning the technology but using it efficiently. The proposed five-criterion system and integral index make it possible to compare AI projects on a single scale and to justify management decisions. On this basis, the following recommendations are made:



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1. Mandatory assessment of AI projects. Calculate the integral efficiency index for every AI project in an HEI above a set value threshold, before implementation and one year after.
2. Adjusting weights. Have an expert group review the criterion weights every three years in line with the institution's strategy.
3. Investment in human capital. Allocate at least 15–20% of an AI project's budget to training staff and students, since this criterion constrains the integral result the most.
4. Indicator database. Create a mechanism for drawing the indicators needed to calculate the integral index automatically from HEMIS and accounting systems.
5. Transparency of results. Publish the efficiency results of AI projects in the HEI's annual report.

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