



International Congress on Economics, Management and Business Studies

Hosted Online from New York, USA

Date: 23rd September, 2026

Website: <https://econferencia.com>

A HYBRID ANALYTICAL-AUDIT APPROACH TO RISK ASSESSMENT IN BUILDING MATERIALS ENTERPRISES

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Abstract

The paper develops a hybrid analytical-audit approach that combines the traditional assessment of audit risk with economic-statistical tools – deviation analysis, regression of costs on output and forecasting models – for building materials enterprises. Analytical procedures under ISA 520 applied to the 2020–2023 statements of three cement producers of Uzbekistan reveal cost growth outrunning output and raw-material and energy over-consumption. A five-stage risk-based audit procedure, a seven-type classification of risks with detection tools and an audit assessment mechanism for environmental assets based on accounts 9430 and 8920 are proposed and have been adopted by the Chamber of Commerce and Industry of Uzbekistan.

Keywords: Building materials industry, cement, risk-based audit, analytical procedures, ISA 520, regression analysis, environmental assets, ISA 540, risk classification.

Introduction

The building materials industry differs from other sectors by its technological complexity, high capital intensity, dependence on raw-material and energy prices, seasonal demand and environmental load, which traditional document-based audit approaches do not capture. The Law "On Audit Activity" [1] and the International Standards on Auditing [2] require the auditor to identify and assess



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the risks of material misstatement, to use analytical procedures as audit evidence and to evaluate accounting estimates (ISA 315, 520 and 540).

Analytical procedures in audit are treated in the work of Arens and Loebbecke [3]; Sergienko [4] developed them for the audit of industrial enterprises; Sabiryanova [5] and Shibileva [6] dealt with risk-oriented management and cost accounting in building materials production; Xajimuratov [7] developed the methodology of financial statement audit; Rahman et al. [8] and Isayev [9] examined cost accounting and efficiency assessment in the industry. An approach that combines audit-risk assessment with economic-statistical modelling for this industry has not yet been formulated.

The aim of the paper is to propose a hybrid analytical-audit approach that integrates the analytical procedures of ISA 520, regression and forecasting models and the risk matrix into one audit procedure, and to test its elements on the data of three cement producers of Uzbekistan.

Materials and methods

The study draws on the 2020–2023 financial statements and cost norms of "Qizilqumsement" JSC, "Ohangaronsement" JSC and "Quvasoysement" JSC, the texts of ISA 300, 315, 320, 450, 500, 520 and 540 [2] and IAS 37 [10]. Horizontal and vertical analysis, comparison of normative and actual costs, regression and correlation analysis of costs against output and profit, expert scoring of the probability and impact of risks, and grouping were applied.

Results and discussion

Analytical procedures in the audit of building materials enterprises are organised in seven directions: cost dynamics against output; normative versus actual unit costs; fixed and variable costs per unit; costs by technological stage; the share of



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environmental costs; the link between costs, profit and profitability; and the detection of anomalies. Applied to the three producers, they showed that at "Qizilqumsement" JSC production cost rose from 224 to 331 and 480 billion UZS in 2020–2022, i.e. by 47.7 and 45 per cent, while output grew by only 20 and 18 per cent; at "Ohangaronsement" JSC the actual unit cost in 2022 was 560 thousand UZS against a normative 480 thousand; at "Quvasoysement" JSC costs and profit grew in proportion (cost 224 → 402, profit 98 → 161 billion UZS). The specific findings are summarised in Table 1.

Table 1. Findings of analytical procedures at the cement producers examined

Enterprise	Problem identified	Key indicators	Audit conclusion and recommendation
Qizilqumsement	Raw-material over-consumption, Portland cement	Norm 1.45 t/t, actual 1.62 t/t (+11.7 %)	Worn conveyor system; modernise transport, tighten technical control
Ohangaronsement	Unit cost of white cement calculated incorrectly	Recorded 480, actual 525 thousand UZS	Depreciation and energy costs misallocated; reallocate costs by product
Quvasoysement	Cost gap between shops, porous blocks	Shop A 350, shop B 405 thousand UZS	High energy use in shop B; renew equipment, raise productivity
Ohangaronsement	Low profitability of special technical cement	Price 580, cost 545 thousand UZS, margin 6 %	Pricing does not secure profitability; revise prices, cut costs
Qizilqumsement	Disproportionate growth of energy costs	Output +8 %, energy costs +19 % (2021–2023)	Kilns not energy-efficient; introduce energy-saving technologies

Source: developed by the author.



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In the hybrid approach vertical and horizontal analysis are supplemented by statistical tools. Regression analysis measures the relationship between output and costs: where costs grow faster than output, over-consumption or inefficient use of resources is investigated as a separate risk; forecasting models extrapolate cost dynamics, so that the audit assesses not only past deviations but also the probability of their recurrence.

The second element concerns environmental assets. The audit assessment mechanism links account 9430 "Depreciation expenses of environmental assets" with account 8920 "Reserves for environmental asset expenses", so that the economic efficiency of an environmental asset, its depreciation burden, operating costs and the obligations attached to it are evaluated together. Under ISA 540 the auditor tests the estimated useful lives, the depreciation method, impairment and the provisions for dismantling, reclamation and restoration; under IAS 37 [10] an obligation is recognised as a provision when it exists, an outflow is probable and the amount can be estimated reliably, otherwise it is disclosed as contingent.

The third element is a five-stage risk-based procedure. First, the auditor studies the enterprise's activities, processes and financial indicators and identifies its risks by group. Second, each risk is scored by probability and impact, and a risk matrix sets the priorities. Third, the audit programme is built around the high-risk areas, where evidence is collected in depth, while low-risk areas are covered by general controls and analytical comparisons. Fourth, the analytical tools – regression of costs and profit, profitability by product, efficiency indicators, deviation analysis, vertical and horizontal comparisons – reveal the root causes of the risks and the probability of their recurrence. Fifth, corrective and preventive recommendations are presented to management in writing and monitored in subsequent audits. The risks identified in this way are classified in Table 2.



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Table 2. Classification of risks identified by the audit in building materials enterprises

Risk type	Typical situation	Audit detection tool	Recommended measure
Financial	Profit miscalculated, depreciation misallocated	Horizontal and vertical analysis, balance sheet comparison	Revise depreciation policy, align with IFRS
Production	Excessive resource consumption, high energy losses	Norm-deviation analysis, comparison of shop indicators	Automated monitoring, control by norms
Market	Prices above competitors, falling sales	Sales dynamics, competitor analysis	Competitive pricing, new markets
Environmental	Improper waste disposal, no environmental audit	ESG indicators, waste monitoring	Separate accounting of environmental payments, filtering equipment
Social	Delayed wages, inadequate safety	Wage analysis, audit of working conditions	Improve conditions, motivation system
Regulatory	Incorrect tax reporting, expired certificates	Audit of legal documents and tax reports	Strengthen internal audit, update documents
Operational	Weak internal control, poor documentation	Analysis of internal documents, audit trails	Strengthen internal audit, automate management

Source: developed by the author.

Audit resources are thus concentrated on the processes with the highest probability of loss. The approach has been adopted by the Sirdarya regional department of the Chamber of Commerce and Industry of Uzbekistan (certificate No. SR-11/485 of 10 April 2026).



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Conclusions

1. The analytical procedures of ISA 520 organised in seven directions and combined with regression and forecasting models exposed, on the data of three cement producers, cost growth outrunning output, raw-material and energy over-consumption and misallocated costs.
2. The audit assessment mechanism based on accounts 9430 and 8920 brings environmental assets, their depreciation burden and the related provisions into one evaluation under ISA 540 and IAS 37 and raises the reliability of financial and environmental information.
3. The five-stage risk-based procedure and the seven-type risk classification turn the audit from a formal verification into a diagnostic and advisory instrument that directs audit resources to the areas of highest risk.

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