FROM INDICATORS TO EARLY WARNING: AN OPERATIONAL SCORING AND MONITORING PROCEDURE FOR THE FINANCIAL SECURITY OF TRADE-UNION HEALTH RESORTS

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Abstract. Purpose: to turn a four-block system of financial-security indicators for socially oriented health resorts into a routine monitoring procedure.

Methods: each indicator is linked to a specific line of the statutory balance sheet and income statement or to voucher records; indicators are normalized to a 0–100 scale, aggregated by geometric mean and checked by a minimum-block rule; the procedure is illustrated on three hypothetical resorts.

Findings: the arithmetic average lets a strong block hide a critical one: a resort with a 25-point asset-renewal score receives 62.5 points, more than a balanced resort with 60. The geometric mean lowers its score to 56.9, and the minimum-block rule flags it for corrective action. Most indicators can be calculated from reports that resorts already submit.

Originality: the paper specifies data sources, scoring, aggregation and response rules that make the indicator system usable by the trade-union federation.

Keywords: financial security; composite indicator; early warning; health resorts; social obligations; monitoring.

Аннотация. Цель: превратить четырёхблочную систему показателей финансовой безопасности санаториев в регулярную процедуру мониторинга.

Методы: каждый показатель привязан к строке бухгалтерского баланса, отчёта о финансовых результатах или учёта путёвок; показатели приводятся к шкале 0–100, агрегируются средним геометрическим и проверяются правилом минимального блока; процедура показана на трёх условных санаториях.

Результаты: среднее арифметическое позволяет сильному блоку скрыть критический: санаторий с оценкой обновления фондов 25 баллов получает 62,5 балла — больше, чем

сбалансированный с 60; среднее геометрическое снижает его оценку до 56,9, а правило минимального блока требует корректирующих мер.

Ключевые слова: финансовая безопасность; интегральный показатель; раннее предупреждение; санатории; социальные обязательства; мониторинг.

Annotatsiya. Maqsad: sanatoriylarning moliyaviy xavfsizligi bo‘yicha to‘rt blokli ko‘rsatkichlar tizimini muntazam monitoring tartibiga aylantirish.

Usullar: har bir ko‘rsatkich buxgalteriya balansi, moliyaviy natijalar to‘g‘risidagi hisobot yoki yo‘llanmalar hisobi qatoriga bog‘landi; ko‘rsatkichlar 0–100 shkalaga keltirilib, o‘rta geometrik bilan birlashtirildi va minimal blok qoidasi bilan tekshirildi; tartib uchta shartli sanatoriy misolida ko‘rsatildi.

Natijalar: o‘rta arifmetik kuchli blok orqali kritik blokni yashirishga imkon beradi; o‘rta geometrik va minimal blok qoidasi bunday holatni aniqlaydi.

Kalit so‘zlar: moliyaviy xavfsizlik; integral ko‘rsatkich; erta ogohlantirish; sanatoriylar; ijtimoiy majburiyatlar; monitoring.

1. INTRODUCTION

Socially oriented organizations face two kinds of risk at once: the financial risk of losing solvency and the mission risk of no longer delivering the service for which they exist. Health resorts of the trade-union system in Uzbekistan are a clear example. They earn revenue from vouchers, maintain a capital-intensive treatment base and are expected to keep recovery affordable for union members and privileged groups. The sector is also exposed to shocks: the number of persons accommodated in sanatoria fell from 528.3 thousand in 2019 to 219.9 thousand in 2020 [9].

In a previous paper we proposed a system of financial-security indicators for such organizations, grouped into four blocks: current solvency, reproduction of the material base, stability of revenue sources and fulfilment of social obligations [11]. That paper set out the logic of the blocks and showed how their combinations distinguish direct financial distress, hidden erosion of assets and commercialization. It deliberately left open how the system should be applied in practice.

This paper fills that gap. It answers four practical questions: where the data for each indicator come from, how indicators measured in different units are brought to a common scale, how block results are combined without hiding a critical weakness, and who should act on the results and how often. The procedure is illustrated on hypothetical resorts, because the purpose is to test the logic of the method rather than to evaluate particular organizations.

2. LITERATURE REVIEW

Composite indicators are widely used to summarize multidimensional performance, but the methodological literature warns about their weak points. The OECD handbook stresses that the choice of normalization and aggregation determines the result and that linear (arithmetic) aggregation implies full compensability: a deficit in one dimension can be offset by a surplus in another [8]. Geometric aggregation reduces this compensability, which is appropriate when a very low value in any dimension signals a real problem.

In the economic-security literature, the financial security of an enterprise is assessed through liquidity, solvency, profitability and the condition of productive assets, compared with threshold values

[2]. Early-warning models in corporate finance, starting with Altman's Z-score, combine several ratios to predict distress [1]. They are built for commercial firms and measure only the financial side. For non-profit and hybrid organizations, Tuckman and Chang defined vulnerability through thin equity, revenue concentration, small margins and lack of administrative slack [10], while Kaplan adapted the balanced scorecard so that the mission, not profit, sits at the top of the measurement system [4; 5]. Hansmann and Moore explain why such organizations must be judged by the service and public value they create rather than by owner returns [3; 7].

The legal framework in Uzbekistan allows trade unions to own property and to conduct business through organizations they establish [6], so the financial and social results of their resorts are formally linked. The gap addressed here is practical: the literature offers concepts and composite-indicator methods, but not a ready procedure that connects specific reporting lines with financial and social thresholds for this type of organization. Earlier work by the first author also showed that aggregate sector statistics cannot reveal such organization-level problems [12].

3. INDICATOR PASSPORT

The first step is to define, for each indicator, how it is calculated and where the data come from. Table 1 shows the core set. The financial indicators use line codes of the statutory balance sheet (Form No. 1) and statement of financial results (Form No. 2) applied in Uzbekistan; the social indicators require voucher records that resorts and trade-union bodies already keep. Indicators marked as "annual" need data that change slowly or are reported once a year.

Table 1. Core indicators, data sources and frequency

Block	Indicator	Source (line codes)	Frequency
1. Current solvency	Current ratio	Form 1: current assets (390) / current liabilities (600)	Monthly
	Cash ratio	Form 1: cash (320) / current liabilities (600)	Monthly
	Wage arrears to monthly payroll	Form 1: payables to staff (720); payroll records	Monthly
2. Material base	Depreciation rate	Form 1: accumulated depreciation (011) / gross fixed assets (010)	Annual
	Asset replacement ratio	Change in line 010 / change in line 011	Annual
	Share of profit retained	Form 2: net profit (270); dividend decisions	Annual
3. Revenue stability	Net margin	Form 2: net profit (270) / revenue (010)	Quarterly
	Share of the largest payer group	Sales records: union vouchers, employers, commercial clients	Quarterly
	Seasonality of occupancy	Bed-days by month	Quarterly
4. Social obligations	Share of guests referred by trade unions	Voucher records	Quarterly

	Share of privileged categories	Voucher records by category	Quarterly
	Price of a privileged voucher to its cost	Price list; cost per bed-day	Annual
	Unmet requests for privileged vouchers	Trade-union waiting lists	Quarterly

Line codes refer to the statutory forms as used in the annual reports of joint-stock resorts.

4. SCORING AND AGGREGATION

Indicators are measured in ratios, percentages and counts, so they must be brought to a common scale. We use min–max normalization within reference bounds: a value at or below the lower bound receives 0 points, a value at or above the upper bound receives 100 points, and values in between are scaled linearly. For indicators where a lower value is better, such as the depreciation rate, the scale is reversed. For example, with provisional bounds of 0.8 and 2.0 for the current ratio, a resort with a ratio of 0.96 receives about 13 points. Block scores are the averages of their indicator scores.

The bounds and the thresholds used below are provisional. They are set for illustration and must be calibrated on actual data of the trade-union resorts, ideally separately for groups of comparable size and treatment profile. The method does not depend on the exact values chosen.

The choice of aggregation matters more. Table 2 compares three hypothetical resorts. Resort A is balanced, with 60 points in every block. Resort B is strong in solvency, revenue and social obligations but has only 25 points for the material base, i.e. it is consuming its assets. The arithmetic mean ranks B above A (62.5 against 60.0), although B is in the more dangerous position. The geometric mean reverses this order (56.9 against 60.0), because it penalizes imbalance between blocks.

Table 2. Aggregation of block scores for three hypothetical resorts (points)

Resort	Block 1	Block 2	Block 3	Block 4	Arithmetic mean	Geometric mean	Lowest block
A	60	60	60	60	60.0	60.0	60
B	80	25	70	75	62.5	56.9	25
C	45	70	50	40	51.3	50.1	40

Hypothetical data. Blocks: 1 — current solvency; 2 — material base; 3 — revenue stability; 4 — social obligations.

Even the geometric mean can leave a critical weakness inside an acceptable total. The procedure therefore adds a minimum-block rule: any block below 40 points requires a corrective plan regardless of the total score. Resort B passes the zone test with 56.9 points but is flagged by this rule. Resort C sits on the boundary in both respects; its weak points are solvency and social obligations, which points to a different response than for B. For the overall score, three provisional zones are used: 70 points and above — stable; 50–69 — attention; below 50 — elevated risk.

5. MONITORING AND RESPONSE

The indicators differ in how fast they change, so they are reviewed at different intervals. Solvency indicators and wage arrears are checked monthly, because a cash gap can develop within weeks. Revenue and social indicators are reviewed quarterly, in line with the seasonal cycle of resorts. Material-base

indicators are assessed once a year and are used when the annual dividend and investment decisions are taken, which is where the risk of asset erosion is created.

Responsibility is shared. The finance department prepares the solvency and revenue indicators; the maintenance department confirms the condition of buildings and equipment and the need for repairs; the unit that keeps voucher records reports on referrals, privileged categories and waiting lists. A working group combines the results and writes a short comment, because no single department sees all four blocks.

The response depends on the result. In the attention zone, the resort prepares a plan with the target indicator, the target value, the deadline and the responsible person. In the elevated-risk zone or when the minimum-block rule is triggered, a stress test is added: a fall in revenue, the loss of a tax benefit, higher repair costs or a cut in voucher funding. After the measures are applied, the scores are recalculated to check that the weak block has improved and that no new problem has appeared in another block.

6. CONCLUSION

The paper turns a four-block system of financial-security indicators into a monitoring procedure for trade-union health resorts. Each indicator is linked to a reporting line or to existing voucher records, so most of the system can be applied without new data collection. Normalization to a common scale, geometric aggregation and a minimum-block rule prevent a strong block from hiding asset erosion or a loss of social access, as the example of resort B shows.

The main limitation is that the reference bounds and thresholds are provisional. The next step is to calibrate them on panel data of the resorts of the trade-union system and to test whether low scores predict later problems such as cuts in services, emergency repairs or requests for financial support.

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