Innovative Methodologies for Measuring and Analysing Corruption Risk

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Abstract

Aim: This study presents a new methodology developed within the framework of the medium-term National Anti-Corruption Strategy (2024–2025) for assessing corruption exposure at the level of government positions and job categories (hereafter: position-based assessment). The paper introduces an analytical model designed to quantify corruption exposure in a structured and comparable way.

Methodology: The methodology was developed within the KAR-MAP software system (Corruption Risk Identification System – Monitoring, Analytics, Prevention) to measure corruption exposure across public service positions. The objective was to establish an evidence-based approach capable of identifying the presence, magnitude, and accumulation of corruption exposure factors (KT1–KT20), as well as the effects of responsibility dimensions and the ranking of positions by exposure level. To ensure comparability, these elements are integrated into a single composite indicator the KKF (from the Hungarian Korrupciós Kitettségi Főszám, i.e., Corruption Exposure Composite Score). The KKF aggregates the distribution and intensity of exposure factors into a normalized, comparable metric without disclosing the protected aggregation logic, providing a structured, quantitative representation of corruption exposure.

Findings: The methodology aligns with the corruption-prevention frameworks of the OECD and UNODC and supports both organizational-level and position-level analysis. By linking micro-level job-specific exposure patterns with macro-level integrity frameworks, it offers a new analytical layer for international

integrity assessment practices. Pilot applications confirmed that identifying exposure hotspots supports targeted integrity-development interventions and strengthens internal control mechanisms.

Value: The methodology and its associated digital analytical environment together constitute a robust and scalable tool that is capable not only of identifying corruption risks, but also of creating a tangible, operational deterrent through their continuous monitoring. The measurement process makes transparent where corruption risks are concentrated within the organization, thereby strengthening organizational integrity and fostering a conscious culture of corruption prevention.

Keywords: corruption exposure; integrity management; KAR-MAP & KKF; data-driven risk analysis

> *'Integrity is doing the right thing, even when no one is watching.'*
> *C. S. Lewis*

Introduction

The timeliness of this publication is underscored by the fact that, under the Medium-Term National Anti-Corruption Strategy for the period 2024–2025 and Government Decision No. 1025/2024 (II.14) on the adoption of the related action plan (hereinafter: the Government Decision), government administrative bodies were required to carry out an assessment of corruption risks at the level of positions and job roles.

In order to ensure a uniform assessment and subsequent comparability, a new questionnaire was developed on the basis of the previous risk assessment tool, closely aligned with its structure and content. This questionnaire was completed by all ministries using a unified set of criteria, covering both their own administrative structures and the bodies under their supervision or control.

This article does not seek to define corruption as a concept, as this has already been extensively addressed in the academic literature.

Our objective, instead, is to present a methodology for measuring corruption risk that builds on earlier approaches while introducing a new, balanced analytical framework that also enables international comparability (Báger, 2011; Klotz, 2013; 2015; 2021).

Background

Identifying and managing corruption risks in the public sector is of paramount importance, as corruption not only undermines public trust but also causes direct economic and social harm (OECD, 2017). International organisations such as the OECD, the United Nations and Transparency International consistently emphasise that the effectiveness of corruption prevention largely depends on the ability of public institutions to systematically identify and measure corruption exposure and to establish appropriate integrity systems in response (UNODC, 2019; Transparency International, 2020).

A wide range of methods has been developed to measure corruption. Traditional approaches include perception-based indices, such as the Corruption Perceptions Index (Transparency International, 2020). While these tools allow for global comparison, they have been subject to substantial methodological criticism due to issues of reliability and subjectivity (Németh, et al., 2019). Another strand of research focuses on data-driven risk models, which identify so-called 'red flag' indicators of corruption, often based on public procurement data (Fazekas et al., 2016). Although these models benefit from greater objectivity, their main limitation is that they typically concentrate on a narrow field, such as procurement.

Within the Hungarian academic literature, several approaches have been developed to map corruption risks at the institutional level. Báger Gusztáv's methodology captures corruption exposure through self-assessment questionnaires (Báger, 2011), while Hajdu Miklós analysed municipal risks using a combination of quantitative and qualitative methods (Hajdu, 2023). Szilágyiné Fülöp Erika examined the detection of abuses in public administration, highlighting the significant influence of organisational culture and the ethical environment on corruption risks (Szilágyiné Fülöp, 2023).

The foundations of the current questionnaire used to assess corruption exposure were originally developed in 2013 by Dr Péter Klotz as part of a job-based system. Subsequently, in the context of mapping job-related integrity risks in 2015, the questionnaire was applied in a modified form in accordance with Government Decision No. 1336/2015 (V.27). The analytical and evaluation methodology introduced in 2021 was developed within the framework of project KÖFOP-2.2.3-VEKOP-16-2016-00001 and served as part of the implementation of the Medium-Term National Anti-Corruption Strategy for 2020–2022, providing guidance on identifying positions and job roles particularly exposed to corruption and integrity risks (Klotz, 2021).

The job-based method applied within this system provides a solid basis for quantifying institutional corruption risks, and its final categories

(low–average–high–very high) are easily communicable to senior management. At the same time, the method entails certain inherent distortions. These include the use of subjective weights assigned to individual factors and a linear, multiplier-based calculation logic, which may excessively amplify the initial risk factor through repeated multiplication. As a result, the overall effect may exceed what would be justified by the actual level of exposure or the methodological objective. This can lead to a systematic upward distortion of results and may also result in other, institution-specific but relevant factors being entirely excluded from the analytical focus.

We examined the potential risks arising from inappropriate weighting practices. On the one hand, they may create a false sense of security: if a high-risk factor is undervalued or does not sufficiently manifest due to the nature of the weighting scheme, a given work process may in reality be far more vulnerable than the calculated result suggests. This can delay or prevent timely intervention. On the other hand, inefficient use of resources may occur when a lower-risk factor is assigned excessive weight, causing the organisation to concentrate efforts on areas where there is no substantial threat, while diverting attention from genuine risks.

Such distortions undermine comparability, rendering comparisons between positions, organisations or institutions unreliable. For example, one organisation may appear to be 'cleaner' than another solely because the applied weights do not reflect actual risks. The greatest danger of flawed weighting lies in misdirecting attention and resources, while genuine risks remain concealed. Ultimately, this may result in a loss of credibility: if the measurement method is weak or overly subjective, trust among participants is eroded, making it more difficult to develop and strengthen an anti-corruption culture.

Our review of existing methods therefore identified several issues that necessitate a shift in analytical perspective. Linear calculation models are unable to capture the synergistic effects arising from the accumulation of risk factors, and mechanical categorisation fails to accurately reflect institutional realities.

Methodology

The methodology presented is the result of a multi-stage research and development process. Building on the prototype-level solutions of an already established and operational corruption identification system, the KAR-System (Surányiné Temesi & Kocsis, 2025), the development progressed towards the implementation of a large-scale analytical system (KAR-MAP) that was tested

and validated using real operational data. The complementary functioning of the two systems enables an integrated, data-driven approach that supports not only the early identification of corruption exposure but also risk-proportionate prevention and decision support at a systemic level, in line with contemporary principles of integrity management and governmental risk management.

Innovation in Measuring Corruption Exposure

Taken together, the risks of distortion identified in earlier approaches justified the introduction of a new methodological perspective that does not rely on pre-defined weights but instead establishes an objective analytical basis derived from actual operational patterns.

In response to these challenges, we developed a new methodology that builds on earlier approaches while clearly advancing beyond them. As a first step, we examined the weighting methodologies underlying previous assessments. However, we found no empirical justification for the applied weighting values; therefore, we incorporated a weighting logic based on frequency and recurrence into our analysis.

The use of accumulations and risk peaks is conceptually similar to the Faze-kas–Tóth red flag index (Fazekas et al., 2016), which demonstrates that frequency and combination are key determinants of risk. Building on this insight, the methodology applied in this study follows the principle of *empirical weight formation* rather than the traditional weighting logic. This means that weight ratios are not predefined, subjective expert weights, but dynamically emerging proportions that naturally arise from the actual frequency distribution of risk factors.

In other words, the model applies data-driven proportional weighting based on real operational patterns and automatically assigns greater weight to those factors that occur frequently, in an accumulated manner, or in conjunction with other risk elements.

This empirically derived weighting structure is considered innovative because it avoids the distortions inherent in conventional normative weighting approaches. The relative importance of individual factors is not determined by expert judgement but by the dataset itself—specifically, by the frequency and relational structure observed within the organisation under analysis. As a result, the model is capable of identifying which combinations of factors carry the highest level of risk.

This type of analysis is also forward-looking because it can be adapted to the specific characteristics of individual organisations. For example, risk factors may be weighted differently in a financial organisation managing grant funding

than in an authority where administrative procedures and discretionary decision-making predominate.

In pursuit of a more methodologically balanced outcome, we adopted the assumption that the corruption risk factors formulated in the questionnaire are equally important, as they are grounded in expert judgement. Consequently, there is no justification for further normative weighting that would privilege one factor over another. Instead, the presence of all factors and the degree of their presence must be made visible. This approach remains valid even in cases where, due to the nature of their activities, different professional fields may face different dominant risks.

On this basis, our methodology incorporates three core innovations:

1) Balanced baseline approach – all corruption risk factors are treated with an identical baseline value, thereby avoiding distortions arising from subjective weighting. The assessment is instead based on analytical proportions derived from the actual patterns of occurrence of the factors.
2) Integration of responsibility dimensions – the risk assessment is influenced by responsibility-related variables such as the number of subordinates and the scope of authorisation for commitments. In addition, other human-resources-related factors may be incorporated, thereby establishing a direct link with human resource and personnel policy analyses.
3) Consideration of accumulation and frequency– the model accounts for the simultaneous presence of multiple risk factors and weights them not only by their presence but also by their frequency of occurrence.

This approach enables us to provide the organisations under review with a methodology based on a balanced analytical logic, in which higher risk levels emerge from the frequency and accumulation of individual risk factors. In addition, the model explicitly examines the impact of responsibility dimensions.

To support clear and efficient analysis, the methodology is complemented by a newly developed data-processing and analytical software tool, KAR-MAP (Temesi & Kocsis, 2026), which enables both general data analysis and targeted, in-depth exploration. Taking interdependencies into account, the system offers approximately 16,000 optional query configurations per organisation. This makes it possible to measure organisational exposure, establish rankings among positions based on corruption exposure, and ensure comparability both within organisations and, potentially, at national level.

The development of the KAR-MAP system constituted not only a technological but also a methodological innovation. The software and the underlying analytical model evolved in parallel through an iterative process. During system

development, feedback from practical application directly informed the refinement of both the questionnaire and the evaluation logic, while also inspiring the exploration of further potential application areas. At the same time, the software development process continuously adapted to methodological insights. Large-sample validation of both the methodology and the KAR-MAP system was provided by the nationwide data collection conducted in 2024–2025, during which data from more than 69,000 positions were processed and analysed (Temesi & Kocsis, 2026).

In order to ensure comparability, we developed the Composite Corruption Exposure Indicator (CCEI), which expresses an organisation's level of corruption exposure through a single aggregated measure. The underlying principle of the calculation is that the model jointly evaluates the frequency and intensity of risk factor occurrence, thereby avoiding misleading conclusions arising from subjective weighting. The methodology derives an overall exposure value from the relative frequency and internal distribution of risk factors within the organisation and presents this value on a standardised, normalised scale. The CCEI thus indicates the extent and frequency with which corruption exposure factors are present in the organisation's operations.

Although the detailed aggregation logic constitutes a protected methodological component of the KAR-MAP software, the indicator nonetheless characterises organisational risk profiles in a measurable, comparable and reproducible manner. The CCEI created through this new methodology enables both intra-organisational and inter-organisational comparison (OECD, 2020), thereby serving as an innovative tool not only for corruption prevention, but also for targeted control measures, prevention-oriented training planning, and human resource decision support. This impact can be further enhanced if measurements are conducted on a continuous basis rather than periodically, as tracking changes over time provides genuine decision support for managers in both personnel-related and organisational matters.

Based on position-level data, the resulting so-called exposure ranking allows for the application of tailored, position-specific preventive techniques.

A further advantage of the method lies in the fact that it does not merely aggregate position-level data in order to demonstrate organisational exposure. Instead, it follows a bottom-up analytical approach, progressing from individual positions through organisational units to the overall organisational exposure. Beyond enabling comparisons between organisations, this approach also makes it possible to identify exposure levels within individual units of a single organisation. Moreover, the results of in-depth analyses may highlight relevant organisational development considerations.

This bottom-up analytical approach thus proceeds from the smallest system element towards larger groupings and overall organisational exposure, ultimately enabling the construction of a national corruption exposure map—namely, a CCEI map (Transparency International, 2020; UNODC, 2019)—thereby opening new avenues for the focused management of risks.

Overall, it is clear that the innovation is twofold: methodological, in terms of the new logic applied to weighting and accumulation, and technological, through the integrated analytical interface provided by the KAR-MAP software.

Data collection and analysis

For the position-based analysis, government bodies completed a uniform corruption risk questionnaire. To ensure consistency in completion, the Ministry of the Interior provided a detailed methodological guideline.

The questionnaire consists of four sections. The first section contains data relating to the specific position or job role, while the second details responsibility dimensions, such as the number of subordinates supervised and the extent of authorisation for commitments. The third and fourth sections comprise twenty questions (17 + 3) related to corruption exposure, focusing on the tasks performed and the location in which those tasks are carried out.

For these questions, the analysis also examines the frequency with which the relevant tasks are performed where they fall within the scope of the given position or job role. Respondents assessed both the presence and frequency of risk factors using an eight-point scale ranging from 'never' to 'daily'.

The twenty corruption exposure (KT 1–20.) risk questions are as follows:
1) Participation in administrative or misdemeanour proceedings.
2) Exercise of powers directly related to legislation, including the initiation of legal acts and the drafting and coordination of legislative proposals.
3) Exercise of employer's powers, including the issuance of employer decisions and personnel-related orders.
4) Exercise of discretionary decision-making authority (based on independent judgement).
5) Involvement in procurement activities, including the conduct of public procurement procedures.
6) Participation in the conclusion of contracts with external individuals or organisations, or involvement in contracts concluded by a subordinate body or background institution with external individuals or organisations.
7) Direct supervision, inspection or enforcement measures related to the economic activities of a business entity or other organisation.

8) Participation in the national evaluation of applications financed from domestic or European Union funds.
9) Participation in the implementation of projects financed from domestic or European Union funds.
10) Handling or record-keeping of cash, bank accounts or other assets exceeding a value of one million Hungarian forints, including all forms of property management related to real estate.
11) Exercise of financial authorisation, countersigning or certification of performance powers.
12) Possession or handling of classified or confidential information, including information that may result in disadvantage to others or confer economic advantage or disadvantage.
13) Direct contact (written, telephone or in-person) with Hungarian citizens, including individuals holding dual citizenship.
14) Direct contact (written, telephone or in-person) with non-Hungarian citizens.
15) Direct contact (written, telephone or in-person) with an executive officer or authorised representative of a business entity.
16) Direct contact (written, telephone or in-person) with an executive officer or authorised representative of a business entity headquartered abroad.
17) Activities subject to inspection or audit by an external authority, in particular the State Audit Office (ÁSZ), the Government Control Office (KEHI), the National Protective Service (NVSZ), a ministry or a government office.
18) Performance of work at a site other than the organisation's headquarters.
19) Performance of work at an external location other than the organisation's headquarters or official premises.
20) Performance of work at a land, water or air border crossing point.

This questionnaire therefore constituted the basis for measurement and analysis. Naturally, the questionnaire can be adapted to the methodology even if a different number of questions or alternative content is applied.

Data collection took place between November 2024 and March 2025, reflecting the organisational situation as of 30 November 2024. A total of 112 government organisations participated in the survey, with more than 69,000 valid position-level questionnaires included.

The collected data were aggregated using the KAR-MAP software, which generated the results by integrating all exposure factors and their frequencies of occurrence through the appropriate weighting logic. The primary objective of the methodology was to examine the occurrence and accumulation of risk factors, while also analysing the impact of responsibility levels.

About item 17 of the questionnaire—*'Activities subject to inspection or audit by an external authority'*—a methodological debate arose concerning its interpretation, as this item may also function as a protective factor. The presence of external oversight can, in itself, strengthen the control environment. However, since the questionnaire developers classified this item among the risk factors and the interpretative instructions assessed the frequency of inspections at the level of the position or job role, item 17 was treated as a risk factor in the analysis.

From an analytical perspective, the associated risk does not stem from the mere existence of oversight, but rather from regular, personal interaction, which under certain circumstances may give rise to exposure to collusion. Accordingly, this item was handled as a risk factor. In future data collections, it would be advisable to clearly distinguish between these two dimensions (*control pressure* versus *collusive exposure*).

For each organisation, the Composite Corruption Exposure Indicator (CCEI) was calculated, together with the presence and intensity of all twenty risk factors at both organisational level and within individual organisational units.

Figure 1.
Example of the extent of presence of the twenty corruption exposure (KT) factors within an organisation
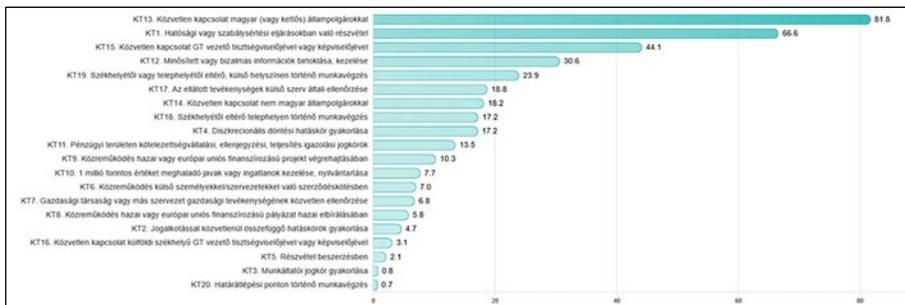
Source. KAR-MAP software.

The charts clearly highlight outliers within the organisation.

Figure 2.
Example of corruption exposure (KT) factors and their extent within a specific organisational unit.

Source. KAR-MAP software.

We presented responsibility-related factors, such as the proportion of staff performing managerial duties, the number of employees under their supervision, and the dimensions of authorisation for commitments. In addition, we identified the top 20 positions with the highest levels of corruption exposure. Naturally, the ranking can be extended to include all staff members if required.

For ministries overseeing several bodies performing identical or similar functions (for example, government offices or school districts), we also provided summary tables to facilitate comparability and enable the easier identification of outliers. At the time of closing the manuscript, the analysis of these aggregated datasets was still ongoing.

Directions for further development of the questionnaire

Based on the experience gained from the survey, the basic logic and structure of the questionnaire proved to function reliably. At the same time, simplification and clarification are advisable at several points in order to ensure consistent interpretation of responses.

Rationalisation of the frequency scale

The current eight-point scale is defined as follows: 1 = never, 2 = at most once or twice per year, 3 = at most six times per year, 4 = at least seven and at most eleven times per year, 5 = monthly, 6 = several times per month, 7 = weekly, 8 = daily. The level of granularity of this scale exceeds respondents' realistic capacity for differentiation and complicates the consistent coding of responses. For future surveys, the use of a five-point scale is therefore recommended: 1 = never, 2 = a few times per year, 3 = monthly, 4 = weekly, 5 = daily. This structure aligns more closely with the natural limits of frequency perception and enhances the reliability of measurement.

Clarification of question interpretation

In future data collections, it would be appropriate to clearly distinguish the dual nature of Question 17 discussed above (*control pressure* versus *collusive exposure*).

According to respondent feedback and analytical experience, Questions 18 (*work performed outside organisational premises*) and 19 (*work performed at external locations*) partially overlap in content. It is therefore recommended that these two items be merged under the heading *external work location*, as

they measure the same type of risk, namely the weakening of the control and supervisory environment.

Question 20—*'Work performed at a border crossing point'*—should continue to be treated as a standalone item, as the nature of this operational context entails a specific and elevated level of exposure.

Introduction of an impact dimension

In the future, it would be advisable to complement frequency-based assessment with an impact or volume indicator, such as the number of clients handled, the financial value of cases, or the volume of commitments authorised. This would help to distinguish situations in which a rarely occurring but high-impact decision (for example, the evaluation of a nationwide grant programme) may pose a greater risk than a frequently performed but low-impact activity.

These modifications would improve the clarity of the questionnaire, the consistency of responses, and the precision of analysis, while also enabling the further development of the KAR-MAP methodology for both practical application and academic research.

Quality Assurance

The reliability of the survey and the consistency of data quality were ensured through a multi-level quality assurance framework.

Cognitive testing

Prior to finalising the questionnaire and completion guidelines, cognitive pilot testing was conducted with sample organisations to assess whether respondents interpreted the individual categories in a consistent manner.

Paralell Assessment

For selected job roles, paired completion was carried out from both managerial and incumbent perspectives. This made it possible to identify interpretative discrepancies and refine the guidance prior to publication.

Data cleaning and logical validation

Data entry was verified against the submitted questionnaires, followed by automated validation within the system after data upload. Missing responses were coded separately in the database, ensuring that they did not distort average values.

Data protection review

The sampling and processing procedures were also validated from a data protection perspective. Aggregated results were published exclusively at organisational level and in pseudonymised form.

These quality assurance measures ensured that the results reliably reflect patterns of corruption exposure across organisations and positions, and provide a solid foundation for the further development of the methodology.

We believe that the results become truly comparable once a brief international comparison is undertaken, examining how the Hungarian exposure questions can be aligned with international procedures and frameworks.

Alignment with International Models

Mapping corruption exposure factors to the OECD integrity framework

A distinctive feature of the twenty-item corruption exposure list developed in this study is that—while it could be further disaggregated for more granular analysis—it is capable of covering the corruption risk areas that typically occur in the public sector. As a next step in the analysis, the individual factors were mapped onto the integrity framework dimensions used by the OECD, thereby enabling international interpretation and comparability of the methodology.

OECD policy documents (OECD, 2005; 2017; 2020) emphasise the importance of integrity in operational processes, human resource management, financial decision-making, public procurement, information management, and control mechanisms. Each of the twenty questions can be assigned to one of these dimensions, meaning that the methodology comprehensively covers the areas identified by the OECD as 'high risk'.

The innovation of the present approach lies in the fact that corruption exposure is examined at the level of individual positions, whereas the OECD framework typically conceptualises integrity risks at organisational level. The methodology therefore provides data at a more granular level, which can subsequently

be aggregated to organisational or sectoral levels, thereby creating a bridge between micro- and macro-level assessments. In addition, the system is complemented by the application of a Composite Corruption Exposure Indicator (CCEI), which enables comparability both within and between organisations.

The CCEI can be embedded within the OECD's probability–impact matrix logic (likelihood × impact matrix). As a result, the domestically developed methodology is not only compatible with international practices, but also adds a new, practically applicable dimension to them.

This approach is particularly relevant in the public sector, where effective corruption prevention and exposure management require insight into risks measurable at the level of specific job roles, rather than relying solely on organisational-level indicators. The classification of the twenty questions using OECD terminology, combined with the application of the CCEI, thus ensures that the method is internationally interpretable while remaining tailored to national specificities.

Table 1 presents the possible alignment of the twenty questions used in the position- and job-based corruption risk assessment conducted under the Medium-Term National Anti-Corruption Strategy for the period 2024–2025 with the OECD integrity dimensions. For the sake of clarity, the table includes simplified formulations of the questionnaire items.

Table 1.
Title: Possible alignment of the NACS questionnaire with OECD integrity dimensions

	Corruption risk exposure factors	**Corresponding OECD dimension**
1	Administrative authority and misdemeanour proceedings	Operational decision-making risks
2	Legislative / regulatory drafting powers	Policy and regulation risks
3	Employer/HR authority (line management powers)	Human resources risks
4	Discretionary decision-making authority	Operational decision-making risks
5	Involvement in procurement / public procurement procedures	Public procurement risks
6	Contracting with external parties (negotiation and execution of contracts)	Contracting and procurement risks
7	Oversight / inspection of business entities (companies)	Regulatory and oversight risks
8	Evaluation of applications (e.g., grants/tenders)	Funding allocation risks
9	Project implementation	Project implementation risks
10	Cash handling and asset management	Asset and financial management risks
11	Commitment authority (authorisation to incur financial obligations)	Financial decision-making risks
12	Handling classified information	Information integrity risks
13	Contact with citizens / the general public	External stakeholder risks
14	Contact with foreign nationals	Cross-border risks
15	Contact with company executives / senior management	Private sector interaction risks

	Corruption risk exposure factors	Corresponding OECD dimension
16	Contact with executives of foreign companies	International business risks
17	External audits/inspections (by external bodies)	Oversight and accountability risks
18	Off-site work (working away from the usual workplace/premises)	Operational and logistical risks
19	Field work at external locations	Field operation risks
20	Work at border crossing points	Border integrity risks

Source. Author'sown compilation.

The relationship between the UNODC integrity assessment model and the national methodology

According to Dargay, *'when anti-corruption and corruption prevention tasks are examined from the perspective of criminal conduct, this field constitutes a sub-area of crime prevention activities.'* Taking this approach into account, we examined the points of connection between the national methodology and the UNODC Anti-Corruption Risk Assessment Framework**,** which represents one of the most comprehensive international standards for identifying and managing corruption risks in the public sector.

The UNODC framework defines four sequential and interrelated phases:
1) Context Analysis – examination of the institution's legal, regulatory and operational environment.
2) Process Mapping – identification of decision points, mandates and chains of responsibility.
3) Risk Identification and Scoring – quantification of exposure points.
4) Mitigation Planning – integration of results into control mechanisms and integrity management systems (UNODC, 2019).

The position-based corruption exposure measurement methodology applied in the present research—based on twenty risk-related questions and incorporating responsibility dimensions—can be directly aligned with the third phase of the UNODC framework, namely Risk Identification and Scoring**.** The novelty of this approach lies in the fact that risk assessment is conducted not at organisational level, but at the micro level, through the analysis of individual positions, their scope of activities and decision-making authority. This enables a more precise assessment of responsibility and risk accumulation, which, within the UNODC framework, is considered one of the most reliable indicators of residual risk.

The developed method also partially covers the second UNODC component, Process Mapping**,** as the majority of questions relate to roles performed

within operational processes (for example, procurement, financial decision-making or the exercise of regulatory authority). By integrating these two components, the methodology becomes interoperable with international integrity assessment models and creates the possibility for the Composite Corruption Exposure Indicator (CCEI) to serve, in the future, as a quantitative risk assessment metric in international comparative analyses.

The UNODC model therefore functions not only as a theoretical reference but also as an international validation framework, demonstrating that the developed methodology is suitable for the practical enhancement of integrity management and is fully aligned with the risk assessment logic recommended by the United Nations.

Table 2 illustrates how the corruption exposure questionnaire (twenty questions) and the associated responsibility dimensions can be mapped onto the four-phase corruption risk assessment model defined by the UNODC (2019). This mapping demonstrates that the national methodology covers the key domains of the international standard and, in several respects, further develops them through its micro-level analytical approach.

Table 2.
Possible alignment of the NACS questionnaire with the UNODC corruption risk assessment model

UNODC phase	Coverage by the National Methodology	Relevant Factor(s)	Comment / Innovation point
1. Context Analysis	Partially covered	17. External audit or inspection 18–19. Work performed at external locations	Elements of environmental and organisational exposure are incorporated into the questionnaire; however, they do not appear as a separate analytical level. This is consistent with UNODC guidelines, where the analysis of organisational and operational context forms part of the preparatory phase.
2. Process Mapping	Fully covered	4. Discretionary decision-making authority 5–11. Financial, procurement and commitment-related decisions	The process-based logic of the methodology directly corresponds to the UNODC-recommended decision-point identification approach, which focuses on identifying exposure points within decision-making processes.
3. Risk Identification and Scoring	Fully covered	All risk-related questions plus responsibility dimensions (managerial status, number of subordinates)	The national model builds upon the UNODC's quantitative assessment logic and extends it to the micro level. The CCEI calculation thus expresses the combined risk weight of organisational and individual factors.
4. Mitigation Planning	Indirect coverage	CCEI results and aggregated organisational-level outputs	The results of the methodology provide a foundation for targeted intervention measures and the development of integrity development plans, in line with the UNODC's corruption prevention approach.

Source. The Author's own compilation.

Based on this mapping, the national corruption exposure assessment methodology fully covers the second and third phases of the UNODC model (*Process Mapping* and *Risk Identification and Scoring*), while also partially implementing *Context Analysis*. The link to the *Mitigation Planning* component is established through the introduction of the Composite Corruption Exposure Indicator (CCEI), as this enables the prioritisation of risk points at organisational level and the definition of integrity development objectives. In this way, the methodology can be interpreted as a micro-level operationalisation of the UNODC framework, enabling uniquely detailed, position-based identification of corruption exposure.

International alignment and interpretation

The methodology is aligned with the OECD Public Integrity Framework (OECD, 2020) and the UNODC Corruption Risk Management Guidelines (UNODC, 2023), while translating their underlying logic to the micro level.

Whereas international frameworks primarily aim to strengthen institutional and organisational integrity at macro level, the present model identifies exposure patterns at the level of individual positions, decision-making authority and responsibility. In doing so, the nationally developed approach builds a bridge between macro-level integrity policy and the micro-processes of everyday operations, effectively translating strategic regulatory objectives into operational preventive interventions.

The methodology therefore not only adapts to international norms, but further develops them by making integrity management measurable at the level of organisational processes and job roles. It transforms theoretical integrity principles into practical, measurable organisational mechanisms, enabling organisations not merely to comply with international standards, but to actively measure and improve integrity within their own operational processes and positions.

Conceptually, the methodology also aligns with the increasingly applied deterrence–detection–disruption model of integrity management, identified by both the OECD (2020) and the UNODC (2021) as a three-pillar approach to corruption prevention. *Deterrence* operates through transparent and accountable decision-making structures; *detection* refers to the early identification of anomalies within operational processes; while *disruption* aims to eliminate organisational conditions that enable risk, such as the accumulation of authorisations or excessive concentration of responsibilities. The position-based exposure assessment model presented in this study relates to all three dimensions and integrates prevention, detection and intervention into a coherent analytical framework,

thereby ensuring that the national methodology renders integrity management not only measurable but also internationally interpretable.

Applicability of the methodology in other fields

International and national integrity and anti-corruption policy documents typically conceptualise risk at organisational level, based on the assumption that unethical behaviour is more likely to emerge in institutions characterised by weak organisational culture, insufficient control mechanisms or limited leadership commitment to integrity. However, this organisational focus inevitably entails the risk that finer patterns of individual exposure remain concealed.

In our view, a bottom-up, question-based approach to risk factors provides a more robust foundation for both prevention and risk management. Examining only organisational averages may obscure exceptional individual or position-based risks that in practice determine the actual level of corruption vulnerability.

Among preventive and control instruments, national security vetting provides a relevant example. Under Hungarian law, *'the purpose of national security screening conducted by the national security services is to assess whether a national security risk can be identified in relation to the individual concerned, with regard to the lawful functioning of the state and the national economy, and—where justified—the security conditions arising from international commitments'* (National Security Act, Section 68(1)).

Such screening, similarly to asset declaration requirements, is primarily linked to the individual and the nature of the position held. It is therefore justified not because the individual is presumed to be prone to corruption, but because the nature of the task itself entails a higher level of risk. This does not imply that the organisation as a whole is highly exposed.

From a practical perspective, based on KAR-MAP output values, the simplified national security screening of an employee handling classified information within a government-supervised body may be substantiated by any frequency value associated with Risk Factor 12 – 'Possession or handling of classified or confidential information'.

Question-based exposure assessment therefore creates added value in areas where legal or internal control mechanisms are explicitly designed to identify task-related risks. The method enables the identification of critical points hidden behind organisational averages, whether in financial, licensing, administrative or high-security positions.

A further advantage of the approach is its ability to reveal informal or non-standard operational elements—such as person-dependent decision points or atypical divisions of labour—which typically remain invisible in conventional organisational-level analyses. As corruption exposure is rarely distributed evenly across an institution but tends to concentrate in specific positions, such fine-grained analysis is essential for targeted interventions.

For this reason, the methodology not only supports integrity programmes, but can also be utilised in human resource strategy planning, the design of rotation and substitution schemes, the designation of internal audit focus areas, and even the preparation of national security screening processes. Position-based exposure assessment thus has the potential to become one of the key data-driven pillars of organisation-wide integrity systems.

Potential linkage with the Solid Moral Integrity Indicator (SZEM) model

Returning to the motto of this publication, integrity ultimately resides not only in external oversight but also in internal conviction. As C. S. Lewis observed, we must act rightly even when no one is watching—because that is the true boundary of protection.

In public administration, individual *propensity towards corruption* can be examined using the SZEM model, which may function as a pre-screening tool prior to the appointment to positions characterised by high corruption risk.

Empirical evidence demonstrates that the SZEM test produces results that can be effectively utilised both at individual level and, through aggregation, at organisational level, providing feedback that is directly applicable to anti-corruption efforts (Münnich et al., 2022).

In their study, Münnich, Hidegkuti and Malét-Szabó (2022) examine the relationship between personal and organisational integrity and present the SZEM model, which aims to measure *solid moral integrity* through the ethical dimensions of public service behaviour. The model seeks to identify moral resilience and ethical competencies that form the foundation of organisational integrity.

The corruption exposure assessment methodology applied in the present study develops this approach in a quantitative direction by measuring position-level decision-making, responsibility and risk dimensions alongside moral and value-based factors. While the SZEM model captures the internal, attitude- and value-based components of integrity, the present methodology quantifies external exposures related to processes, mandates and decision structures.

The two approaches can therefore contribute to a comprehensive assessment of integrity in a complementary manner: the SZEM model provides the ethical

foundation, while the exposure assessment method delivers an objective mapping of corruption risks. Empirical examination of the integration of the two models constitutes a promising avenue for future research, particularly with regard to exploring the relationship between ethical attitudes and exposure patterns.

This dual perspective is consistent with international integrity and anti-corruption standards (OECD, UNODC, ISO 37001), which advocate the joint assessment of value-based and system-based components of organisational integrity. Accordingly, the nationally developed methodology promotes not only ethical awareness, but also the introduction of data-driven risk assessment in public sector integrity management.

The role of deterrence and perceived control in linking integrity and exposure models

The relationship between organisational integrity and corruption exposure is shaped not only by rules and processes, but also by human behaviour. Employees' decisions are influenced simultaneously by the degree of autonomy they perceive, their sense of personal control over decisions, and their perception of the deterrent strength of rules and oversight mechanisms.

Perceived control refers to the extent to which individuals feel able to act according to their own judgement with limited external constraint. This is not inherently problematic; autonomy combined with responsibility is desirable in many positions. However, when perceived control becomes excessive while organisational oversight remains weak, exposure may increase, as the consequences of decisions become less transparent.

Deterrence, by contrast, operates from the organisational side and reflects the extent to which operational rules, ethical norms, feedback mechanisms and control systems sustain a culture of compliance. Even the awareness that an organisation systematically analyses exposure hotspots can have a deterrent effect, particularly when heightened attention is applied to certain areas.

Together, the KAR-MAP methodology and the SZEM model therefore not only serve to measure risk, but also provide a form of behaviour-shaping feedback. Conscious attention and transparency function as preventive mechanisms in their own right. This *visibility* creates a balance in which individual decision-making autonomy and organisational control operate not in opposition, but in mutual reinforcement.

Combined, the two approaches are capable of illustrating the dynamic equilibrium through which organisational deterrence and individual perceived control jointly sustain integrity.

Management information

One of the key considerations in developing the methodology was to ensure that senior management receives a transparent picture of the distribution of risks, the critical points, and the areas where controls need to be introduced or strengthened.

  The position-based assessment made it possible to identify risk at the level of individual positions and, where relevant, to demonstrate—either for specific positions or for organisational units—where the greatest number of risk factors coincide (for example, a finance officer working at a border crossing point, or a manager responsible for an EU-funded project who supervises 14 subordinates and also exercises discretionary decision-making authority).

  The methodology also enables the identification of exposure types and the extent of their presence, i.e. which types of risks dominate within a given organisation. These may include, for example:

*   Financial and material risks**:** cash and asset management, authorisation for commitments, procurement, EU funding.
*   Decision-making and mandate-related risks: discretionary decisions, legislative functions, employer's powers.
*   Relationship risks: contact with citizens, business entities and foreign counterparts.
*   Information risks: possession and handling of classified/confidential information.
*   Work environment risks: work performed away from headquarters, at external locations, at satellite sites, or at border crossing points.

Based on the data, management can see that corruption exposure is not limited to financial or legal domains, but also arises, for example, in external liaison and information management.

  The results make it possible to identify which positions represent the highest corruption exposure, which organisational units warrant enhanced controls or review, whether any particular task area entails exceptionally high exposure, and whether new regulation or other mitigation measures are justified.

  These insights provide an excellent basis for effective planning of organisational controls and preventive measures—for instance, where rotation may be necessary (especially in roles involving external contacts, inspections or border crossing points), where the *four-eyes principle* should be applied (e.g. separating authorisation for commitments from countersignature), which processes require stronger transparency and documentation, and where integrity training or targeted ethics training is likely to be most effective.

Decision-support outputs of the KAR-MAP methodology for a typical institution

Position-based measurement of corruption exposure is not an end in itself. Its purpose is to generate decision-support information that can be directly applied in institutional integrity management, internal control systems and human resource decisions. Outputs of the KAR-MAP methodology can be interpreted at several interrelated levels, supporting different managerial and professional decision-making contexts.

Position-level outputs

The basic unit of analysis is the frequency-based profile of exposure factors assigned to individual positions. This value does not refer to an individual's behaviour, but to the combined presence and frequency of decision-making, responsibility-related and operational risks associated with the role.

Position-level results enable the identification of exceptionally high-exposure positions, the separation of dominant risk dimensions (for example financial, decision-related, relational, or information-related exposure), and the determination of whether exposure in a given position is concentrated or arises from the accumulation of multiple factors.

These insights are primarily useful for the design of targeted controls, rotation or substitution schemes, and the designation of areas requiring enhanced managerial attention.

Organisational unit-level outputs

The methodology also allows position-level results to be aggregated and interpreted at the level of organisational units. In this case, the focus is not on a single average value; instead, frequency-weighted proportions yield a typical exposure profile for the unit. This makes visible the degree of internal heterogeneity and highlights exposure hotspots within the unit that deviate from the organisational average. In effect, the system produces an exposure profile.

This approach helps avoid a common distortion of analyses based solely on organisational averages, which may conceal critical positions, and it supports differentiated, risk-proportionate interventions.

Ministry/institution-level decision support

At this level, the analysis shows which risk types dominate within an organisation, in what proportions they occur, and which operational areas they are most strongly associated with. For senior management, it becomes interpretable whether corruption exposure is primarily financial/managerial, decision- and mandate-related, or relational in nature, and whether risks are concentrated in a few positions or dispersed across many roles.

On this basis, management can assess whether an organisation-wide regulatory intervention is warranted, or whether targeted control measures are sufficient. The KAR-MAP CCEI applied at ministry/institution level uses frequency-weighted exposure proportions, thereby enabling comparability across organisations.

Typical decision-support uses

The outputs of the methodology can be applied directly in a range of practical areas, including: risk-based planning of internal audit and integrity work programmes; task redistribution; and the design of rotation and substitution schemes—particularly in positions involving external liaison, inspection, or licensing functions.

When applying the *four-eyes principle* or other control mechanisms, the methodology provides an objective selection logic for identifying areas requiring enhanced oversight. Based on exposure values, it also helps define the focus and target groups for integrity trainings and ethics trainings.

In this way, the KAR-MAP methodology not only enables the measurement of risks, but also supports their interpretation and management, in line with the risk-based approach articulated in international integrity management frameworks.

It should be emphasised, however, that position-level and organisational unit-level exposure results are intended primarily for internal managerial decision support and should not be understood as public classification or ranking instruments.

Future developments

At present, a limitation for continuous managerial reporting is that the methodology is based on periodic surveys, as the Government Decision requires ministers to conduct position-based risk analysis, but does not mandate continuous monitoring.

The long-term objective, however, is to establish a system in which exposure data can be updated and maintained dynamically, in near real time. This would enable trend identification and the exploration of relationships between exposure and staff turnover, workload and training gaps.

The integration of artificial intelligence (AI) and predictive analytics may fundamentally reshape the risk analysis process. Both the OECD (2020) and the UNODC (2021) highlight automated *red-flag detection* as a modern tool for corruption prevention, enabling the system not only to identify suspicious patterns but also to assess them probabilistically and contextually.

Accordingly, a key future development direction is an AI-supported assessment module capable of forecasting potential exposure hotspots based on changes over time and organisational events such as staffing changes or modifications in decision-making chains.

Following the identification of a corruption case, the system may also support feedback-based validation, allowing assessment of whether the position's prior exposure classification was consistent with subsequent events. This function not only measures model accuracy but also provides objective, data-based review of the judgements made by those conducting risk assessments. The development of such learning systems aligns with the European Commission's digitalisation priorities (European Commission, 2023), which emphasise extending real-time, data-driven monitoring to enhance the effectiveness of anti-corruption measures.

Measuring corruption risk is therefore not a one-off exercise but an ongoing learning process in which both technology and human judgement play a central role.

Application of the methodology in an integrated KSZDR environment

During the processing of the position-based survey under the National Anti-Corruption Strategy 2024–2025, the KAR-MAP methodology was implemented in a standalone, separated technological environment. Processing relied exclusively on pseudonymised, non-identifiable position-level data, enabling full compliance with data protection requirements. The methodological results confirmed that the logic developed for measuring position-level exposure is capable of producing transparent, comparable indicators that genuinely reflect organisational operations.

The application of the methodology was approved at professional level by the Administrative State Secretary of the Ministry of the Interior, meaning that the

survey results were recognised as an official element of governmental integrity management. This represents an important milestone, as the methodological approach was developed not as a commissioned product, but to enable the effective and uniform execution of a nationwide public task, and therefore constitutes an empirically validated contribution in its own right.

With regard to future usability, the Deputy State Secretary for Human Resources expressed support for the potential future integration of the methodology into the Government HR Decision Support System (KSZDR). The methodological significance of this is twofold.

First, it indicates that the methodology is suitable to become part of an existing, legally established state decision-support system. Integration into KSZDR would enable corruption exposure data to become an integral element of government HR processes—such as job structure design, role and responsibility definition, and impact assessments of organisational changes. In this way, the methodology would become not merely an analytical tool, but part of a continuously updated knowledge base supporting the functioning of the public service.

Second, the integrated KSZDR environment opens new analytical opportunities: time-series tracking of exposure, evaluation of intervention effectiveness, comparison of organisational patterns, and predictive modelling of exposure levels could all be implemented at a higher level of quality. The key methodological advantage is that organisational- and position-level exposure data can be interpreted within a shared analytical space with HR system data, thereby enabling more comprehensive analysis.

Professional support for the proposed integration indicates that the methodology goes beyond the function of a one-off survey and is suitable to become a permanent, institutionalised element of public service integrity management. This conveys that a solution has been developed for government administration which not only addressed the current task reliably, but can also contribute in a sustained and systemic manner to transparency and decision support in the public service.

Raising the possibility of KSZDR integration therefore does not merely imply a technical extension of the system, but constitutes a form of methodological quality assurance and validation. The model developed for measuring corruption exposure is capable of aligning with one of the most important HR decision-support infrastructures in Hungarian public administration. This is a significant professional recognition and also indicates that, under appropriate authorisation and data governance arrangements, the methodology may in the future play a substantive role in strengthening integrity protection across central government administration.

Conclusion

International practice in measuring corruption and identifying integrity risks typically focuses on organisational or national levels (OECD, 2005; 2017; 2020). One of the most significant innovations of the methodology presented in this study is that it collects and evaluates data at the level of individual positions. This approach enables the identification of critical risk points within public sector institutions, while organisational-level aggregation ensures comparability—including at international level—and provides robust managerial decision support.

  A further innovative element of the methodology lies in its new weighting logic. Instead of relying on earlier subjective approaches, it applies the principle of empirical weight formation. The relative importance of factors is not derived from predefined weights, but from actual frequencies of occurrence, accumulation and co-occurrence patterns. This provides a more objective, data-driven basis for interpreting risk patterns.

  The Composite Corruption Exposure Indicator (CCEI) represents an additional innovation, enabling benchmarking both within organisations and across organisations. The indicator is suitable for internal comparisons (for example, between organisational units within a single institution) as well as for external comparisons (for example, between organisations performing similar functions). The CCEI can be integrated into the probability–impact-based risk approach applied by the OECD (the *likelihood–impact matrix*), which classifies risks according to their probability of occurrence and expected impact (OECD, 2005).

  Mapping the dimensions of the twenty-item exposure list to the OECD integrity framework provides further assurance of the methodology's international relevance. OECD documents emphasise the importance of integrity in operational processes, human resource management, financial decision-making, procurement, information integrity and control mechanisms (OECD, 2017; 2020). According to the new methodology, all of these domains can be captured through the defined risk factors, reinforcing alignment with international norms.

  Overall, it can be concluded that the methodology is not only applicable within the national context, but is also interpretable and usable at international level.

  From a practical perspective, the method is not merely a narrowly defined anti-corruption tool, but is also suitable for supporting human resource policy and organisational development. Position-level data reveal when certain roles are excessively exposed or overburdened, thereby enabling the introduction of targeted training, controls or rotation schemes. Through this approach, the methodology builds a bridge between micro- and macro-level assessments and contributes to aligning public sector corruption prevention practices with

international integrity assessment standards. Taking all these aspects into account, the new methodology represents a necessary and timely innovation in corruption prevention.

During development, the refinement of the methodology and the KAR-MAP system progressed through a mutually reinforcing, iterative process, in which practical application directly informed methodological improvements.

Practical implementation of the methodology has also confirmed that the model is sufficiently mature to provide a unified, methodologically reliable analytical basis within public service decision-support systems, including the KSZDR.

In summary, the presented methodology represents a new generation of approaches to corruption prevention, being the first to enable objective, comparable, position-level measurement of corruption exposure. The model simultaneously complies with international integrity standards and accommodates national operational specificities, thereby establishing a new foundation for identifying and managing corruption risks in the public sector. Its true value lies in its ability to translate identified patterns into concrete development and prevention opportunities, forming the core structure of a data-driven, transparent and professional integrity management system.

When applied in conjunction with the KAR-MAP digital analytical environment and the process-level approach of the KAR-System, the methodology goes beyond classical risk identification. By enabling corruption exposures to be not only measured, but also continuously monitored and interpreted, the system becomes an integral part of everyday organisational operations and constitutes a genuine deterrent effect. This transparency not only enhances analytical accuracy, but also contributes to the creation of an organisational environment in which the visibility of risks itself reinforces rule-compliant behaviour and a culture of integrity.

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Statements

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