



# SCIENTIFIC BASIS OF INNOVATION

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## BAYESIAN-FORESIGHT APPROACH TO THE PREDICTION OF SOCIAL TENSION IN UKRAINE IN THE MEDIUM TERM

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**Introduction.** During the period of war and profound social transformations, Ukrainian society demonstrates high variability in socio-psychological reactions, which underscores the need for quantitative measurement of social tension as an indicator of societal equilibrium.

**Problem Statement.** Under conditions of rapid change, traditional sociological methods do not ensure timely forecasting of crisis processes because they fail to capture the nonlinearity of social dynamics and the impact of emotional and informational factors. This has created an urgent need for a cognitive-analytical model capable of integrating large datasets, expert assessments, and Bayesian forecasting methods in real time.

**Purpose.** To develop an interdisciplinary approach for forecasting social tension in Ukraine for the medium term (2026—2027) using Bayesian modelling, foresight scenario analysis, OSINT monitoring, and artificial intelligence tools.

**Materials and Methods.** The N—CH psychosocial model has been applied to integrate cognitive, motivational, and external-evaluative parameters of public perception. Empirical data have been obtained through OSINT monitoring using the GDELT, Google Trends, and Media Cloud platforms, complemented by cognitive text analysis performed with large language models (LLaMA 3).

**Results.** A digital analytical platform, N—CH, has been developed to calculate the social tension indicator in real time, conduct sentiment and emotional analysis of public communications, and generate

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time series of societal moods. The model has revealed a cyclic dynamic of social tension in Ukraine over 2000—2025, with a peak value of  $CH \approx 9$  in 2022 and a trend toward stabilization at an elevated level in 2025—2027. Foresight scenario analysis has identified three baseline development trajectories — controlled peace, prolonged stagnation, and escalation and disruption — with their probabilities estimated through a Bayesian posterior distribution.

**Conclusions.** The proposed approach has proven effective for the quantitative forecasting of social risks and can serve as a foundation for a strategic humanitarian security monitoring system. The  $N-CH$  model enables the early detection of phases of social instability and improves the adaptability of government policy in the sphere of societal resilience.

*Keywords:* social tension, Bayesian modeling, foresight scenario analysis, OSINT monitoring, artificial intelligence, cognitive analytics, scenario planning.

Modern Ukraine has been undergoing a period of profound social transformation driven by war, economic instability, and a crisis of public expectations. Under these conditions, the timely detection, analysis, and forecasting of social tension — a phenomenon that reflects the level of societal equilibrium, institutional trust, and citizens' readiness for collective action — has become particularly urgent. Traditional sociological approaches often prove insufficient for capturing the rapid and multidimensional processes unfolding in the public sphere under the influence of military, informational, and economic factors.

This situation creates the need for a scientifically grounded and integrated monitoring system that combines psychosocial models, big-data analytics, artificial intelligence methods, and foresight research tools. The article addresses this challenge by developing a Bayesian-foresight approach to forecasting the dynamics of social tension in Ukraine, enabling quantitative assessment of societal destabilization risks, the formation of alternative development scenarios, and support for decision-making in the fields of humanitarian and security policy.

The study is based on an integrated interdisciplinary methodology that combines the psychological theory of social tension as a collective (supra-individual) psycho-emotional state of society with contemporary approaches to big-data analytics, artificial intelligence tools, foresight (anticipatory) technologies, and scenario planning methods. Social tension is defined as an integral indicator of societal equilibrium, which reflects the

collective psycho-emotional state of society in the face of internal and external challenges [1, 2]. In this context, social tension is examined as a systemic reaction of society to extreme living conditions — in particular war, economic instability, and widespread social frustration [3, 4].

The central element of the model is the formula of the integral indicator [1]:

$$N = O + \frac{O_2 - O_1}{2} + iV + jW, \quad (1)$$

where each parameter reflects a distinct component of societal perception:  $O$  is the overall evaluation of the current situation;  $O_1$  is the retrospective assessment of the past (in comparison with the present);  $O_2$  is the forecast of the future development of the situation;  $V$  is the level of satisfaction with one's own ability to influence events;  $i$  is the degree of internality, that is, the perceived sense of responsibility for events and control over them;  $W$  is the assessment of the effectiveness of external influence (international actors);  $j$  is the level of influence attributed to these actors.

The term  $\frac{O_2 - O_1}{2}$  in the formula above corresponds to the averaged subjective evaluation by respondents of the improvement or deterioration of the situation in both retrospective and prospective terms. A negative assessment of the past is interpreted as a factor that decreases the level of social tension, whereas a positive assessment increases it. At the same time, when respondents assess the future state of the situation, a negative evaluation

of the past is assumed to increase, and a positive evaluation to decrease, the level of social tension. The parameters  $V$  and  $W$  are multiplied by  $i$  and  $j$ , respectively, in order to account for the personal relevance of these indicators to the respondent.

The indicator  $N$ , calculated according to the formula above, can theoretically vary within a range from +8 (the lowest level of tension) to -8 (the highest level) [1]. The predicted values of social tension ( $CH$ ) are expressed on a more intuitive conventional scale (-10 to +10), where -10 corresponds to the lowest level of tension and +10 corresponds to the highest. Research findings [1] have indicated that  $CH = 5$  represents the threshold of social shock, that is, the point at which the system enters a self-reinforcing zone of instability. In this regime, societal behavior becomes nonlinear, and the dynamics of social reactions begin to be shaped by the interaction of three key factors: the level of institutional trust, the emotional and psychological state of the population, and the influence of crisis or mobilizing triggers (political, security-related, or economic).

To automate the recalculation of the  $CH$  indicator from the computed value of  $N$ , a linear correspondence between the two scales is established, as both scales have symmetric ranges but different boundaries: the  $N$ -scale ranges from +8 (minimum tension) to -8 (maximum tension), while the  $CH$ -scale ranges from -10 (minimum tension) to +10 (maximum tension).

The conversion is performed using the linear scaling:

$$CH = a \cdot N + b, \quad (2)$$

where  $a$  is the scaling coefficient (the ratio of the amplitudes of the two scales);  $b$  is the offset that aligns the directions of the scales.

The final formula for recalculating the  $CH$  indicator based on the computed value of  $N$  is an empirical approximation of a linear relationship:

$$CH = -1.25N. \quad (3)$$

where  $N \in [-8, +8]$ ;  $CH \in [-10, +10]$ .

The presented social tension model (1–3) is a generalized psychosocial construct that combines

individual assessments of a situation with macro-level characteristics of societal equilibrium. It allows not only quantitative reconstruction of the emotional-evaluative dynamics of public sentiment but also the identification of critical social shock thresholds and zones of potential destabilization. The integration of parameters from the cognitive ( $O, O_1, O_2$ ), motivational ( $V, i$ ), and external-evaluative ( $W, j$ ) blocks provides a comprehensive representation of the relationship between individual perceptions of events and the collective behavioral response of society. Owing to its flexibility, the model can be applied both to retrospective analyses of social crises and to the development of forecasts and scenarios for future phases of tension, serving as a methodological foundation for the quantitative monitoring of social stability and humanitarian security in Ukraine.

Further development of this approach is achieved through the integration of the quantitative model of social tension (1–3) with contemporary mathematical methods and artificial intelligence technologies. In the proposed architecture, the intelligent system for assessing social tension is implemented as the  $N$ — $CH$  digital analytical platform that combines data, algorithms, and cognitive interpretation of results. Its central component is the set of OSINT-analytics tools (Open Source Intelligence) [5, 6] providing systematic monitoring of open information sources — public media, social networks, and digital databases such as GDELT [7], Google Trends [8], and Media Cloud [9].

By combining automated data collection, classification, and semantic content analysis, this approach makes it possible to quantify the emotional background of society, identify informational triggers, and track weak signals of potential social destabilization. Thus, the  $N$ — $CH$  platform (Fig. 1) functions as an integrative instrument that connects the social tension model (1–3) with a set of mathematical and digital tools that support monitoring and intelligent analysis of big data, scenario modeling, and artificial intelligence operations for forming a dynamic indicator of the state of the social system in real time.

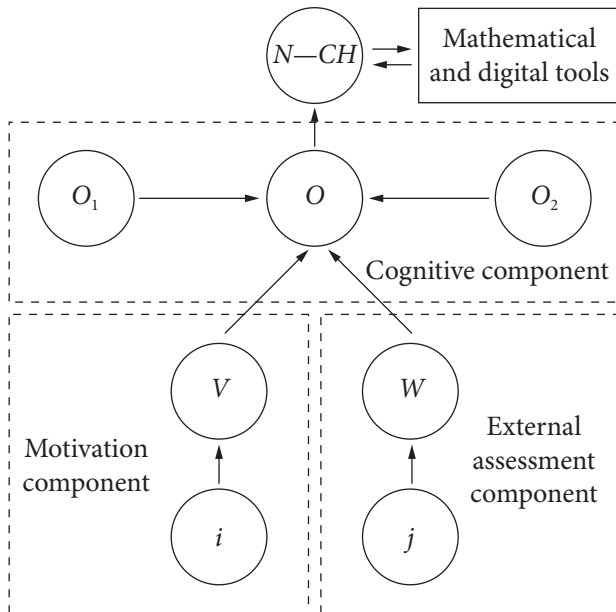


Fig. 1. Intelligent system for assessing social tension

An important role in the study is played by the cognitive analysis of data using new-generation large language models (in particular, LLaMA 3 [10]) and data mining methods [11, 12]. The LLaMA 3 model, interacting with the cognitive block ( $O, O_1, O_2$ ), makes it possible to classify texts by emotional categories — fear, anger, trust, indifference — and to determine the overall polarity of the communication space. This creates the basis for automated mapping of public sentiment, identifying key themes of social anxiety, and constructing time series of collective emotional dynamics.

In parallel, foresight analysis and scenario planning are applied, enabling the formation of alternative scenarios for the development of social processes in the short- and medium-term prospects (2026—2027), taking into account strategic trends, structural risks, and external influences [13—15].

The final analytical level is the Bayesian model for assessing scenario probabilities, which provides quantitative determination of posterior distributions of key indicators of social dynamics. This approach increases the reliability of forecasts by integrating objective OSINT-analysis results with

expert assessments, statistical parameters, and the dynamic characteristics of the model [16—19].

During the implementation of the study, more than two million digital messages have been analyzed, resulting in a generalized “emotion map” of Ukrainian society that covers approximately 300—500 thousand unique users [8]. This volume of data ensures a level of representativeness comparable to classical sociological surveys with samples of 50—70 thousand respondents.

The applied interdisciplinary methodology combines humanities and techno-scientific approaches — from social psychology to contemporary methods of mathematical modeling, scenario planning, and artificial intelligence. It provides an integrated foundation for the quantitative measurement of social tension within the coordinates of stability, anxiety, and potential escalation. It is on this methodological platform that the following sections of the study are built, revealing the dynamics, nature, and consequences of social tension in Ukraine.

### DYNAMICS OF SOCIAL TENSION IN UKRAINE (2000—2025)

During 2000—2025, Ukrainian society experienced several waves of socio-political turbulence, which were consistently interspersed with phases of temporary stabilization (Table 1, Fig. 2).

The  $CH$  curve (Fig. 2) shows nine major crisis phases. According to the model (1—3), the average peak value of the social tension indicator  $CH$  for 2000—2025 is approximately 5.7, with a standard deviation of  $\pm 1.25$  and a monotonically increasing trend. This indicates that during crisis periods Ukrainian society entered a zone of moderately high tension without reaching the threshold of systemic destabilization ( $CH \approx 10$ ). In periods of stabilization the indicator rapidly decreased to  $CH = 2—4$ , which corresponds to a state of relative social equilibrium.

The lowest peak values (around 5.0) have been reported for the economic and political crises of 2008—2011, whereas the highest (9.0) ones have

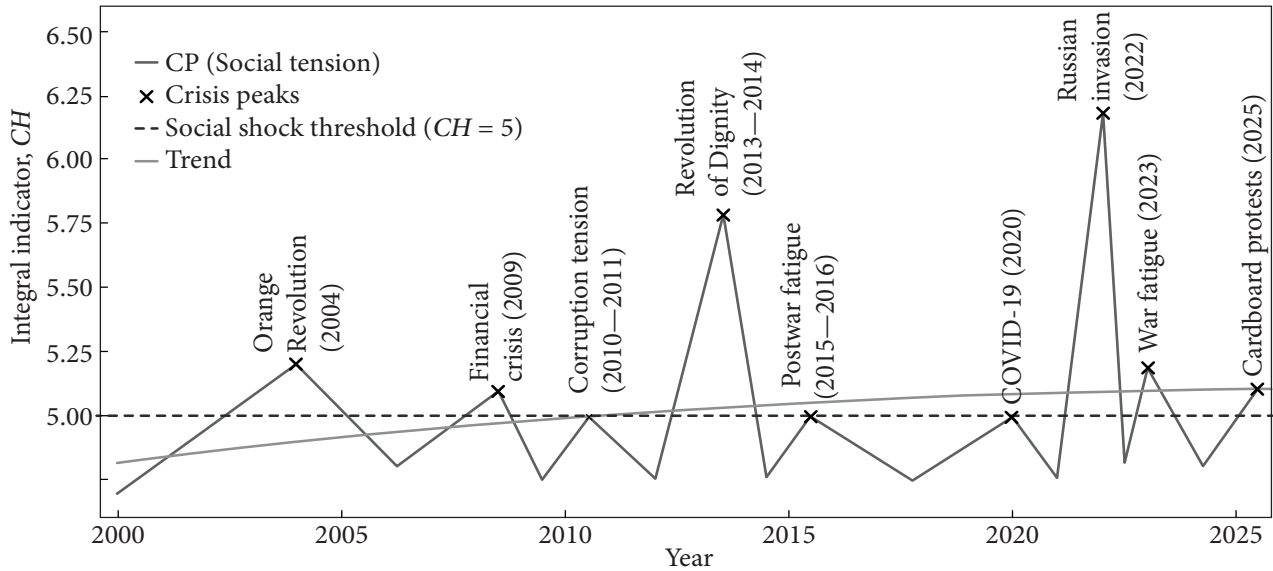


Fig. 2. Dynamics of social tension in Ukraine, 2000–2025

been observed in 2022, during Russia’s full-scale invasion of Ukraine. The periodicity of crisis fluctuations is on average 4–5 years, which confirms

the cyclical nature of social tension, while deviations within  $\pm 1.2$  units indicate a moderate resilience of the social system to external shocks.

Table 1. Crisis Periods in Ukraine (2000–2025)

Period/event	Main triggers	Peak values of CH	Description
2004 — Orange Revolution	Electoral fraud, political mobilization, elite confrontation	≈5.3	Political crisis, mass rallies
2008–2009 — Global financial crisis	GDP decline, hryvnia devaluation, rising unemployment	≈5.1	Economic destabilization
2010–2011 — Centralization of power	Authoritarian tendencies, corruption, social disillusionment	≈5.0	Political tension
2013–2014 — Revolution of Dignity	Euromaidan, violent actions, annexation of Crimea	≈7.6	Political explosion, outbreak of war
2015–2016 — War in Donbass, economic decline	Resource exhaustion, losses, uncertainty	≈4.8–5.0	Chronic social tension
2020 — COVID-19 pandemic	Lockdown, economic downturn, fear and distrust	≈5.0	Socio-psychological crisis
2022 — Full-scale invasion of Ukraine by the Russian Federation	War, casualties, migration, and fear	≈9.0	National crisis, conscription
2023 — Protracted war, frustration	Fatigue, delays in supplies of military aid, disillusionment after the unsuccessful Armed Forces counteroffensive	≈5.2	Growing anxiety
2025 (July) — “Cardboard protests”	Dissatisfaction with conscription, distrust in authorities, social fatigue	≈5.1	Short-term social turbulence

The first pronounced peak of social tension occurred in 2004 during the Orange Revolution and represented a sharp yet controlled fluctuation [1, 2]. While mass surveys in the pre-election period documented a kind of “release” of tension associated with positive electoral expectations among citizens [4], the announcement of falsified results of the second round of the presidential elections on the night of 21–22 November triggered a rapid surge of the *CH* indicator to approximately 5.3. Elevated tension persisted until the Supreme Court of Ukraine issued its decision ordering a repeat vote (3 December) and the third round of the election was held (26 December). The *CH* indicator gradually declined thereafter as the conflict shifted into a legal framework and public trust in state institutions was restored. This dynamic reflects a pattern characteristic of Ukraine’s social equilibrium: an upward protest impulse that concludes with institutional stabilization, demonstrating the society’s ability to self-regulate without losing structural integrity.

The second peak in 2008–2009 ( $CH \approx 5.1$ ) is associated with the global financial crisis that caused a decline in GDP, devaluation of the hryvnia, and rising unemployment [21, 22]. The subsequent phase in 2010–2011 was driven by excessive centralization of power and the intensification of corruption, which kept *CH* at around 5.0 — the threshold of social tolerance for political tension [22, 23]. A sharp increase in *CH* occurred in 2013–2014 ( $CH \approx 7.6$ ), driven by the events of the Revolution of Dignity, the annexation of Crimea, and the outbreak of war in Donbas [20, 24]. In 2015–2016, social tension decreased to a relatively lower level ( $CH \approx 4.8$ – $5.0$ ), reflecting a phase of exhaustion and adaptation following profound shocks [22].

The COVID-19 pandemic in 2020 did not cause a dramatic spike in the indicator, keeping it at approximately  $CH = 5.0$ , but it did reveal new dimensions of social interaction, including growing trust in civic initiatives and volunteer networks [24].

In 2022, the highest *CH* level — up to 9.0 — was recorded, corresponding to a state of national mobilization during the full-scale war. In this period, tension assumes a different quality, becoming

*consolidation-driven*, as society unites around the goals of survival and victory [25–28].

After the 2022 peak, the *CH* indicator decreases to 5.1–5.2 in 2023–2025, indicating a phase of adaptation, behavioral rationalization, and partial stabilization at an elevated level of social tension [20, 25, 29].

Each peak of social tension has a dual nature: it reflects deep societal contradictions, crises of trust, economic or security instability, and simultaneously stimulates self-organization and horizontal civic linkages [1, 4, 30, 31]. However, these positive effects are not automatic. They emerge unevenly across communities: alongside moral-psychological mobilization, fatigue, disillusionment, and fragmentation of local groups increase [32]. After each crisis phase, Ukraine demonstrates adaptation and partial renewal, yet this process is accompanied by psychological and demographic losses — including the emigration of the active population, erosion of social capital, and exacerbation of regional disparities [20, 25, 26].

Thus, social tension in Ukraine is not solely a destructive phenomenon, but it also cannot be regarded as a guaranteed catalyst of development. Its constructive potential is realized only when mechanisms for channeling tension are in place — institutions of trust, dialogue, volunteerism, education, and civic participation [1, 4, 32]. Over the 2000–2025 period, the dynamics of social tension indeed retain a cyclical structure; however, the upward trend suggests that conventional self-regulatory resources are becoming depleted. The elevated *CH* levels in 2022–2025 combine societal cohesion with the risks of social fatigue and misaligned expectations, underscoring the need for a targeted stabilization policy [20, 25, 26].

## SYSTEMIC REVIEW OF FACTORS OF SOCIAL TENSION IN THE SECOND HALF OF 2025

In the second half of 2025, Ukraine has entered a phase of increasing systemic social tension driven by the combined effects of prolonged military hos-

tilities, economic vulnerability, political uncertainty, and widespread psychological fatigue among the population. Social dynamics increasingly exhibit features of chronic anxiety that is becoming a structural characteristic of the country's internal condition.

The war remains the key trigger, continuing in the form of a protracted and exhausting positional confrontation without a strategic breakthrough. The absence of tangible progress is depleting collective resilience: despite the persistence of a high level of patriotic unity, emotional exhaustion, disappointment, and frustration are intensifying in the rear.

International support, while formally maintained, is showing signs of fatigue. Public discourse increasingly includes calls for "political compromise" and doubts regarding long-term security guarantees, which generate skepticism in relations with partners and reinforce a sense of uncertainty.

The economic situation remains challenging. Budget deficits, inflation, stagnation in the real sector, and limited investment contribute to a pervasive sense of stagnation and lack of prospects within society. The most vulnerable groups continue to be internally displaced persons, pensioners, public-sector employees, and residents of border regions.

Mobilization policy that was previously perceived as a necessary instrument of defense is gradually becoming a source of social tension. A lack of transparency in decision-making, declining trust in conscription procedures, and growing contra-

dictions between the front and the rear are creating zones of social mistrust and increasing the risks of internal polarization.

Social expectations associated with victory and post-war recovery are becoming less clearly defined, taking on an anxious and fragmented character. War is gradually being integrated into everyday life as a "new normal," transforming societal resilience into latent vulnerability. Even under conditions of patriotic unity, a concealed conflict emerges with uncertainty and a growing sense of powerlessness.

The combination of external factors (war and geopolitical uncertainty) and internal factors (economic stagnation, mobilization-related tensions, and social fatigue) operates synergistically, creating conditions for the gradual accumulation of social pressure. This process implies a slow escalation of tension, which manifests itself in declining tolerance for uncertainty, localized outbreaks of discontent, erosion of institutional trust, and the intensification of destructive informational influence rather than a sudden destabilization.

Under these circumstances, anticipatory management of social risks becomes critically important through early warning instruments, OSINT analytics, analysis of emotional patterns, and foresight modeling. Their systematic application makes it possible to identify weak signals of destabilization and to exercise adaptive management of the society's social energy. This requires a shift from passive observation to active governance of social

Table 2. OSINT-Based Assessments of the Parameters of the Social Tension Model (1–3) in the Second Half of 2025

Parameter	Forecasted indicator values	Comments
$O$ (assessment of the situation)	-0.7	War, economic destruction, and losses
$O_1$ (assessment of the past)	+1.1	Romanticized memory of the pre-war period
$O_2$ (expectations of the future)	-0.3	Unstable prospects for peace
$V$ (influence on the situation)	-0.6	Limited civic agency
$i$ (internality)	0.6	Active civic participation is preserved
$W$ (assessment of external influence)	-0.5	Growing skepticism about the influence of the collective West
$j$ (assessment of the strength of external influence)	0.85	Its presence is acknowledged

processes through public dialogue, transparent communication, and the formation of a shared vision of the future.

Table 2 presents an assessment of the parameters of the social tension model (1–3) as of the second half of 2025, obtained through the analysis of open sources using OSINT methods and data from digital platforms such as Google Trends, the GDELT Project (Global Database of Events, Language, and Tone), and Media Cloud [5–9].

Thus, at the current stage, the level of social tension amounts to  $N = -2.2$  ( $CH \approx 2.8-3.1$ ), which corresponds to a moderate state of social dynamics with a tendency toward further growth and gradual fragmentation of public trust (values of  $CH$  in the range 2–4 are typical of a stabilization phase).

The obtained results have indicated that the second half of 2025 is characterized by the formation of a chronic, inertial configuration of social tension, which generates long-term risks to the state’s internal stability and its adaptive capacity.

**ASSESSMENT OF SOCIAL TENSION PARAMETERS FOR 2026–2027**

**Assessment of the Social Tension Model Parameters (1–3) for 2026.** The year 2026 may become a turning point, as society enters a phase of chronic tension against the backdrop of a protracted war, economic uncertainty, and a gradual loss of optimism regarding the future. Despite the persistence of patriotic consolidation, signs of psy-

**Table 3. OSINT-Based Assessments of the Parameters of the Social Tension Model (1–3) in 2026, Obtained Using Tools [5–9]**

Parameter	Forecasted indicator values	Comments
$O$ (assessment of the situation)	-0.9	The war drags on, economic stagnation persists, and frustration increases
$O_1$ (assessment of the past)	+1.2	Nostalgia for the pre-war years gets intensified
$O_2$ (expectations of the future)	-0.5	Expectations of stability remain blurred
$V$ (influence on the situation)	-0.7	A growing sense of powerlessness emerges
$i$ (internality)	0.6	Civic engagement is still present
$W$ (assessment of external influence)	-0.6	Skepticism toward international support increases
$j$ (assessment of the strength of external influence)	0.85	External influence is acknowledged, but its effectiveness is questioned

**Table 4. OSINT-Based Estimates of Social Tension Model Parameters (1–3) for 2027, Obtained Using Tools [5–9]**

Parameter	Forecasted indicator values	Comments
$O$ (assessment of the situation)	-1.2	The situation is perceived as hopeless
$O_1$ (assessment of the past)	+1.3	The contrast with the past deepens
$O_2$ (expectations of the future)	-0.7	Expectations are predominantly pessimistic
$V$ (influence on the situation)	-0.8	Belief in one’s own influence declines
$i$ (internality)	0.55	Civic motivation decreases
$W$ (assessment of external influence)	-0.8	Disillusionment with external assistance grows
$j$ (assessment of the strength of external influence)	0.8	External influence is acknowledged, but its effectiveness is questioned

chological fatigue and growing distrust toward state institutions and external partners become more pronounced (Table 3).

The integral indicator of social tension in 2026 equals  $N = -2.6$ , which corresponds to a level of  $CH \approx 3.25\text{—}3.6$ . This range reflects a state of elevated but still manageable social tension. It indicates the preservation of relative social stability while simultaneously signaling increasing risks of polarization and localized crises of trust.

**Assessment of the Social Tension Model Parameters (1—3) for 2027.** In 2027, the social system is expected to approach a critical level of tension, at which the accumulated effects of prolonged war, economic fatigue, and the erosion of a predictable future may trigger either large-scale demobilization of public sentiment or localized social outbursts (Table 4).

The value of the integral indicator equals  $N = -3.3$ , which corresponds to  $CH \approx 4.1\text{—}4.4$ , indicating proximity to the threshold zone of social shock. Such dynamics necessitate anticipatory state action, including the strengthening of systemic monitoring, analytical forecasting, and the implementation of proactive humanitarian policies aimed at stabilizing social processes and preventing crisis manifestations.

**Methodological Clarifications.** The indicator  $N$  has a fixed value, as it is calculated using the analytical formula (1), in which all parameters ( $O, O_1, O_2, V, i, W, j$ ) take numerical values derived from OSINT analysis or expert assessments. By contrast, the  $CH$  indicator, defined by formula (3), is presented as a range of values reflecting statistical uncertainty and variability in societal responses.

The average measurement error of individual parameters is estimated at  $\pm 0.05\text{—}0.1$ , resulting in a cumulative uncertainty of  $\pm 0.2\text{—}0.25$  for  $N$ , which after scaling corresponds to  $\pm 0.25\text{—}0.3$  for  $CH$ . For example:  $N = -2.2 \rightarrow CH = 2.75 \pm 0.3$  ( $\approx 2.45\text{—}3.05$ );  $N = -2.6 \rightarrow CH = 3.25 \pm 0.35$  ( $\approx 2.9\text{—}3.6$ );  $N = -3.3 \rightarrow CH = 4.13 \pm 0.27$  ( $\approx 3.9\text{—}4.4$ ).

Thus, the fixed value of  $N$  represents the analytical state of the social system, whereas the  $CH$  interval characterizes the probabilistic spectrum of

societal reactions driven by measurement uncertainty and the dynamics of the population's emotional and psychological background.

Accordingly, the integration of the quantitative social tension assessment model (1—3) with foresight methodology — based on expert judgment, OSINT analysis, and weak-signal detection — has enabled the construction of an integrated  $N\text{—}CH$  model. This model combines statistical regularities with cognitive-expert interpretation, providing a systemic foundation for strategic planning in the humanitarian and security domains.

At the same time, the  $N\text{—}CH$  model has certain limitations related to the quality of source OSINT data, the subjectivity inherent in expert assessments, and potential shifts in external parameters in the course of long-term forecasting.

## SCENARIOS OF SOCIAL TENSION IN UKRAINE FOR 2026—2027

To model scenarios of social tension in Ukraine for the period 2026—2027, an integrative approach that combines a quantitative assessment methodology based on the  $N$  and  $CH$  indicators with a foresight methodology aimed at the systematic anticipation of future alternatives under conditions of high uncertainty has been applied. This integration makes it possible to construct scientifically grounded scenarios in which the dynamics of social tension are treated as a dependent variable that is sensitive to the influence of key societal and political drivers.

The quantitative assessment of social tension relies on model (1—3), whose parameters represent the cognitive components of societal perception of the present, the past, and the future, as well as levels of agency, trust, and the evaluation of external and internal influences. The foresight methodology [13—15] complements this approach by enabling the identification of critical drivers of change, the detection of long-term trends (megatrends), the construction of multiple “what-if” scenarios, and the integration of OSINT analysis results, expert judgments, and weak signals of shifts in public sentiment.

The scenario space is structured along four key axes of uncertainty:

- ◆ the security context, ranging from military escalation to stabilization;
- ◆ the effectiveness of public governance, ranging from managerial crisis to strategic capacity;
- ◆ economic dynamics, ranging from prolonged recession to sustainable recovery;
- ◆ societal expectations, ranging from frustration to confidence and psychological resilience.

Combinations of these axes form distinct scenario clusters. Within each scenario, typical values of the parameters of formula (1) are specified, namely  $O$ ,  $O_1$ ,  $O_2$ ,  $V$ ,  $W$ ,  $i$  and  $j$ . In this way, the quantitative model (1–3) provides a numerical assessment of the integrated state of society through the  $N$  and  $CH$  indicators, while the foresight approach defines the space of possible futures and allows the future dynamics of social tension to be simulated for each scenario.

As a result of applying this approach, three baseline scenarios of social tension dynamics in Ukraine are identified (Table 5).

The parameters of formula (1) for these scenarios are given in Table 6.

We conduct a scenario-based study of the dynamics of social tension in Ukraine for the period 2025–2027 with the aim of identifying the probable ranges of the  $CH$  indicator, as well as interpreting its underlying causes, risks, and developmental potentials (Tables 5 and 6).

**Scenario A — Controlled Peace** (*optimistic; probability — 25%; projected CH: 2.0 in 2026, 1.8 in 2027*). Under this scenario, the  $N$  indicator takes on positive values, indicating a reduction in social anxiety, an increase in trust in institutions, and the mobilization of society toward reconstruction. The scenario assumes a gradual exit from the phase of active hostilities and a transition to a conditional “frozen conflict.”

The decisive factors include rising investment inflows, the launch of national recovery programs, political stabilization, and the restoration of confidence in state institutions. The level of social tension declines as a result of improved social expectations, strengthened civic agency, and growing optimism regarding the future. At the same time, governance constraints and the risk of revanchist tendencies persist; however, the overall vector of public sentiment is oriented toward stabilization and reconstruction.

Table 5. Baseline Scenarios of Social Tension in Ukraine for 2026–2027

Scenario	Probability	Security context	Public administration	Economic dynamics	Social expectations	Integral estimate of social tension
A (Controlled Peace)	25%	Ceasefire	Effective	Revival of the economy	Pragmatism	Moderate $CH$ (~2)
B (Prolonged Stagnation)	50%	War	Poor	Stagnation	Frustration	High $CH$ (~3.5)
C (Escalation and Rupture)	25%	War escalation	Crisis	Collapse	Demoralization	Critical $CH$ (~4.5)

Table 6. OSINT-Based Estimates of the Parameters in Formula (1) for Social Tension Scenarios in Ukraine for 2026–2027 (estimates obtained using tools [5–9])

Scenario	$O$	$O_1$	$O_2$	$V$	$i$	$W$	$j$	Indicator $N$
A (25%) Controlled Peace	+0.2	+0.8	+1.0	-0.2	0.65	+0.3	0.75	0.4
B (50%) Prolonged Stagnation	-0.9	+1.2	-0.5	-0.7	0.6	-0.6	0.85	-2.7
C (25%) Escalation and Rupture	-1.3	+1.3	-1.1	-0.9	0.5	-0.9	0.8	-3.6

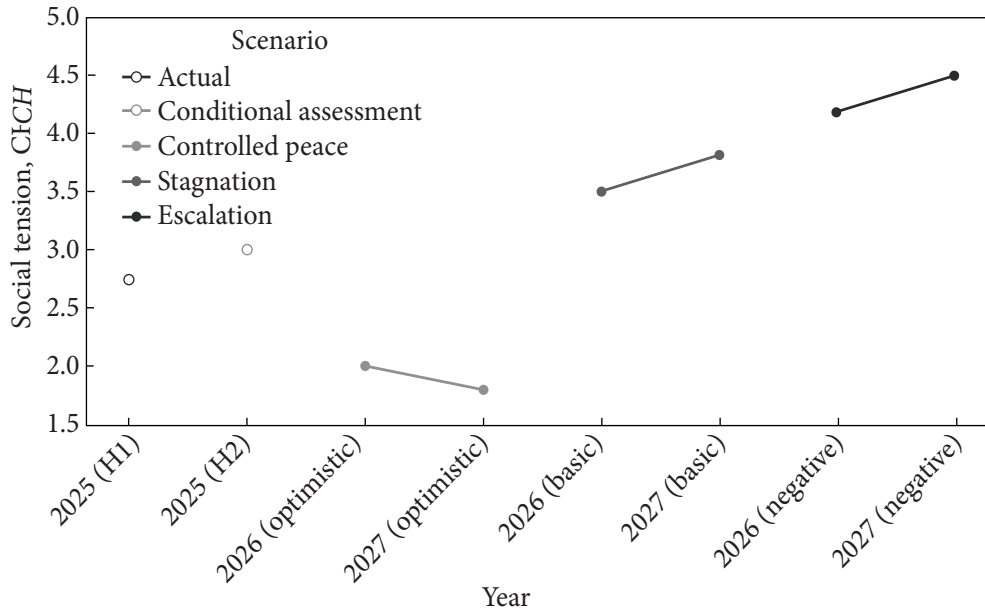


Fig. 3. Projected dynamics of social tension in Ukraine (2025–2027)

Quantitative parameters:  $O = +0.2$ ,  $O_1 = +0.8$ ,  $O_2 = +1.0$ ,  $V = -0.2$ ,  $i = 0.65$ ,  $W = +0.3$ ,  $j = 0.75$ ,  $N = +0.4$ .

Social tension declines to  $CH = 1.8–2.1$ ; expectations and mobilization readiness for reconstruction increase.

**Scenario B — Prolonged Stagnation** (*baseline; probability — 50%; projected CH: 3.5 in 2026, 3.8 in 2027*). This baseline scenario is the most probable. It is characterized by a moderately negative value of  $N \approx -2.7$  ( $CH = 3.5–3.8$ ), which reflects a state of social fatigue and adaptation — a specific equilibrium between tension and resilience. In this mode, the system remains manageable but requires targeted stabilization measures.

The war becomes protracted, with active hostilities continuing in selected sections of the front; international assistance slows, and the economy operates at the threshold of sustainability. Under these conditions, public frustration intensifies, institutional trust erodes, and perceptions of a threatening and uncertain future become more pronounced. Anxiety, frustration, and dissatisfaction with mobilization policies deepen, while narratives of social injustice spread.

As a result, the level of social tension remains elevated with a tendency toward gradual increase, necessitating the active use of mitigation instruments, targeted support for vulnerable groups, and a proactive information and communication policy.

Quantitative parameters:  $O = -0.9$ ,  $O_1 = +1.2$ ,  $O_2 = -0.5$ ,  $V = -0.7$ ,  $i = 0.6$ ,  $W = -0.6$ ,  $j = 0.85$ ,  $N = -2.7$ .

$CH = 3.4–3.8$ ; the risk of the spread of protest sentiments intensifies, particularly with regard to social justice, mobilization, and corruption.

**Scenario C — Escalation and Rupture** (*pessimistic; probability — 25%; projected CH: 4.2 in 2026, 4.5 in 2027*). Under this scenario, the security situation deteriorates sharply: the front becomes destabilized, state governance fragments, and society experiences deep polarization. The indicator  $N$  declines below  $-3$  ( $CH = 4.2–4.5$ ), signaling profound frustration, a loss of societal agency, and a growing risk of social upheaval [13, 14].

Mass emigration, declining trust in public authorities, psychological exhaustion, and the erosion of a shared vision of the future drive social tension to a critical level. Society approaches a state of social shock, in which collective behavior becomes

increasingly nonlinear and unpredictable. Under such conditions, the implementation of an emergency crisis-intervention strategy, the establishment of inclusive dialogue mechanisms, and the restoration of state legitimacy become imperative.

Quantitative parameters:  $O = -1.3$ ,  $O_1 = +1.3$ ,  $O_2 = -1.1$ ,  $V = -0.9$ ,  $i = 0.5$ ,  $W = -0.9$ ,  $j = 0.8$ ,  $N = -3.6$ .

$CH = 4.0$ — $4.5$ ; signs of mass destructive reactions and an increasing risk of social upheaval are observed.

Figure 3 illustrates the dynamics of social tension ( $CH$ ) in 2025—2027, demonstrating a pronounced scenario-dependent pattern. The initial level in the first half of 2025 is 2.74, corresponding to a heightened yet still controlled societal tension. By the second half of the year, the  $CH$  indicator rises to 3.0, reflecting the accumulation of anxiety, uncertainty about the future, and fatigue from the ongoing war. This increase can be interpreted as an early warning signal that society is entering a risk zone, associated with the potential escalation of protest or destructive sentiments.

The described trends in the dynamics of social tension have indicated that it is not only a function of external events but also a result of perceptions, expectations, and trust. Accordingly, social tension is subject not only to observation but also to active strategic management. Timely forecasting and interpretation of these trends make it possible not only to identify potential points of escalation but also to create conditions for soft intervention, prevention, and the redirection of public expectations into a constructive channel.

### BAYESIAN ASSESSMENT OF SOCIAL TENSION SCENARIO PROBABILITIES

In assessing social tension using the  $N$ — $CH$  model, a key task is to determine the plausibility of each scenario. This is achieved using a statistical approach based on the assumption that the integral system indicator  $N$  for each scenario  $s$  follows a normal distribution with parameters  $\mu$  (the expected value representing the average level of so-

cial stability) and  $\sigma$  (the standard deviation reflecting the level of uncertainty in the system) [16].

This hypothesis is natural for complex social systems, in which a set of interrelated factors forms a Gaussian distribution of aggregated indicators. Accordingly, the basic assumption is  $N/s \sim N(\mu, \sigma^2)$ .

Hence, the random variable  $N$  that characterizes the state of the social system for scenario  $s$  follows a normal distribution with mean  $\mu$  and standard deviation  $\sigma$ .

The probability of observing a specific value  $N_s$  given the known parameters  $\mu$  and  $\sigma$  is determined by the probability density function of the normal distribution [16]:

$$p(N_s / \mu, \sigma) = \frac{1}{\sqrt{2\pi}\sigma} \exp\left[-\frac{(N_s - \mu)^2}{2\sigma^2}\right]. \quad (4)$$

Since the normalization factor  $1/\sqrt{2\pi}\sigma$  is common to all scenarios, to compare their likelihoods — a measure of how well the initial assumption explains the observed data — it is sufficient to use the proportional form:

$$L_s \propto \exp\left[-\frac{(N_s - \mu)^2}{2\sigma^2}\right]. \quad (5)$$

The function  $L_s$  represents a quantitative measure of the consistency of scenario  $s$  with trend or empirical data: the closer  $N_s$  is to the trend-based expectation  $\mu$ , the more plausible the scenario [17].

To account not only for the statistical proximity of  $N_s$  to the trend but also for the a priori significance of each scenario, we apply the Bayesian updating formula:

$$P(s/\text{data}) = \frac{\pi_s L_s}{\sum_{s'} \pi_{s'} L_{s'}}, \quad (6)$$

where  $\pi_s$  is the prior probability of scenario  $s$ , and  $P(s/\text{data})$  is the posterior probability of the scenario after incorporating new data. Thus, the probabilistic space is redistributed among the scenarios according to their consistency with empirical observations [16—18].

For each scenario (A, B, and C), we define the centroids  $N_A = 0.4$ ,  $N_B = -2.7$ , and  $N_C = -3.6$  as representative mean values of the integral social ten-

sion indicator  $N$  (formula 1), reflecting the empirical structure of socio-political processes in Ukraine in 2024–2025. Given the socio-political structure of this period, the prior probabilities are set as  $\pi_A = \pi_C = 0.25$  and  $\pi_B = 0.5$ . This distribution reflects the dominance of the baseline scenario (“positional warfare, institutional fatigue, weak economy”) and the symmetry of extreme trajectories — toward stabilization (scenario A) or destabilization (scenario C).

For the 2026–2027 period, the likelihoods are calculated relative to the trend distribution  $N/s \sim N(\mu, \sigma^2)$ , where  $\mu = -1.6$  and  $\sigma = 1.4$ , reflecting high structural uncertainty in key dimensions — security, governance, economy, and public expectations. For the three model scenarios — A, B, and C — using parameters  $\mu = -1.6$  and  $\sigma = 1.4$  and prior probabilities  $\pi_s = (0.25, 0.50, 0.25)$ , the parameters of models (5) and (6) are calculated (Table 7).

From Table 7, it is evident that the highest posterior probability  $P(s/data)$  corresponds to scenario C, indicating a tendency toward increased social tension under adverse external and internal conditions.

Thus, the obtained posterior probabilities  $P(s/data)$  reflect the likelihood of each scenario being realized under the dynamic conditions of a war-

time and post-war environment. To verify the robustness of these results, a sensitivity analysis of the Bayesian model is conducted.

**SENSITIVITY ANALYSIS AND VERIFICATION OF THE BAYESIAN SOCIAL TENSION MODEL**

The model (4–6) allows us to determine how changes in the parameters  $\mu$  and  $\sigma$  affect the distribution of posterior probabilities for the scenarios of the social system under study. Figures 4 and 5 and Table 8 present the study results, showing how variations in these parameters influence the posterior probabilities  $P(A/data)$ ,  $P(B/data)$ , and  $P(C/data)$ . The calculations have been performed using formulas (4–6), varying the parameters  $\mu$  and  $\sigma$  to evaluate the model’s sensitivity.

Based on the Bayesian calculations summarized in Table 7, a sensitivity analysis of the posterior probabilities of the scenarios  $P(A/data)$ ,  $P(B/data)$ , and  $P(C/data)$  been conducted for different values of  $\mu$  and  $\sigma$  (Table 8, Figs. 4 and 5).

The results of the sensitivity analysis of the Bayesian model have shown that when  $\sigma$  decreases, the system becomes more determined, and the probability of Scenario B (Prolonged Stagna-

Table 7. Bayesian Estimate of the Probabilities of Social Tension Scenarios

Scenario	$N_s$	$\pi_s$	$L_s$	$\pi_s L_s$	$P(s/data)$
A (Controlled Peace)	0.4	0.25	0.315	0.0788	0.2479
B (Prolonged Stagnation)	-2.7	0.50	0.192	0.0960	0.3018
C (Escalation and Rupture)	-3.6	0.25	0.626	0.1566	0.4503

Table 8. Final Posterior Probabilities of the Scenarios for Different Values of the Parameters  $\mu$  and  $\sigma$

Parameter	Value	$P(A/data)$	$P(B/data)$	$P(C/data)$
$\sigma$	1.0	0.236	0.567	0.197
$\sigma$	1.4	0.247	0.523	0.23
$\sigma$	2.0	0.262	0.475	0.263
$\mu$	-1.9	0.222	0.544	0.234
$\mu$	-1.6	0.247	0.523	0.23
$\mu$	-1.3	0.278	0.496	0.226

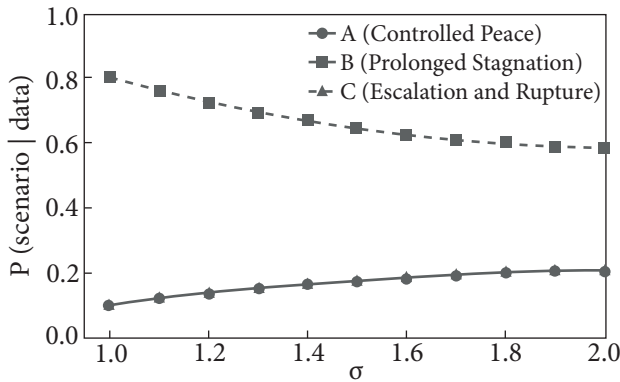


Fig. 4. Dependence of the posterior probabilities of the scenarios on the parameter  $\sigma$  ( $\mu = -1.6$ ). The curves for scenarios A (Controlled Peace), and C (Escalation and Rupture) virtually coincide

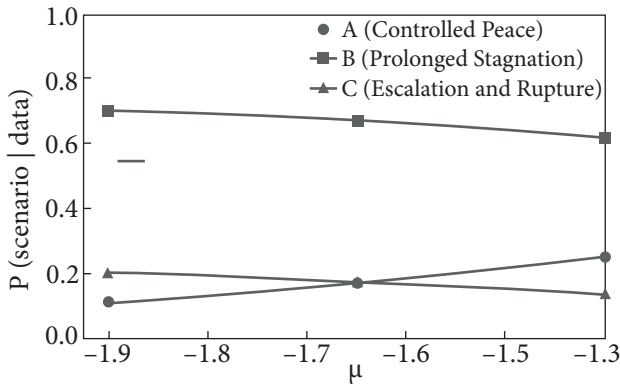


Fig. 5. Dependence of the posterior probabilities of the scenarios on the parameter  $\mu$  ( $\sigma = 1.4$ )

tion) increases. Conversely, when  $\sigma$  increases, uncertainty grows, and the system shows a tendency toward the extreme scenarios A or C. A positive shift in  $\mu$  (from  $-1.9$  to  $-1.3$ ) leads to an increased probability of Scenario A, corresponding to a more stable social state, while a negative shift in  $\mu$  raises the probability of Scenario C, reflecting escalation processes [17–20].

Numerical modeling has indicated that the most stable configuration corresponds to  $\mu = -1.6$  and  $\sigma = 1.4$ , for which the scenario probabilities are distributed as  $P(A) : P(B) : P(C) \approx 0.25 : 0.52 : 0.23$ . These results are very close to the prior distribution  $P(A) : P(B) : P(C) \approx 0.25 : 0.50 : 0.25$ . This

small difference indicates the model’s validity and its ability to adequately represent the real balance of stabilizing and destabilizing tendencies in the social system. The resulting distribution reflects a state of moderate social tension, dominated by Scenario B (Prolonged Stagnation). This condition can be interpreted as an adaptive equilibrium between social risks, resilience, and the society’s recovery potential.

Summarizing the results of this study, it should be noted that the intelligent system for assessing social tension, based on the Bayesian model, has the potential to become an effective tool for strategic risk management and humanitarian stability. Its functional capabilities include:

- ◆ detecting the thresholds of social shock ( $CH \geq 5$ ) before the system enters a crisis phase;
- ◆ identifying zones of elevated risk in real time;
- ◆ forecasting probable trajectories of social conditions depending on external and internal triggers;
- ◆ supporting decision-making in humanitarian and security policy based on analytical monitoring of societal moods.

The integration of Bayesian assessment with sensitivity analysis has made it possible to quantitatively determine the probabilistic structure of scenarios and verify the stability of social tension forecasts. The proposed model provides a methodological foundation for creating an adaptive humanitarian security system in Ukraine, capable not only of accurately diagnosing the state of society but also of supporting the development of strategies for its stabilization, recovery, and enhancement of social resilience.

### STRATEGY AND TOOLS FOR MONITORING AND STABILIZING SOCIAL TENSION IN UKRAINE

The model of social tension (1–3), complemented by modern digital analysis technologies, can be transformed into an effective tool for strategic management, capable of providing a quantitative interpretation of societal changes, creating an ana-

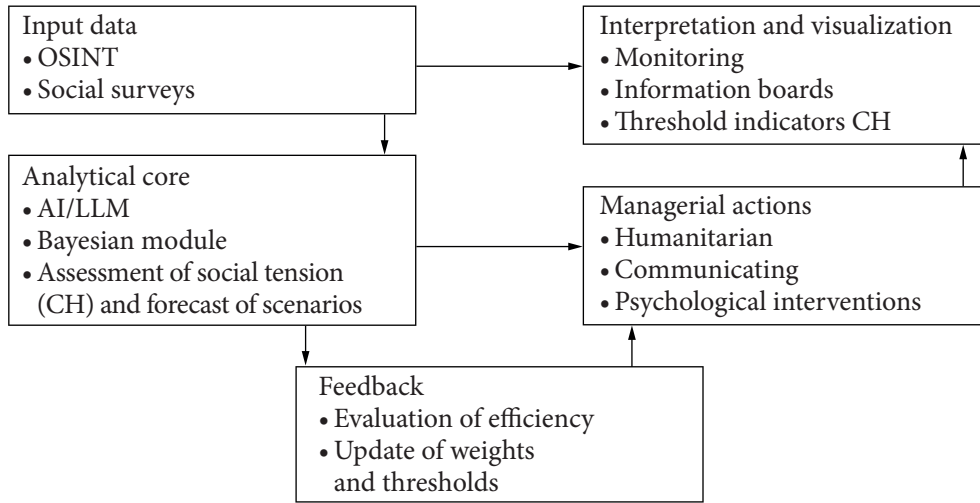


Fig. 6. Structural diagram of the  $N-CH$  analytical platform

lytical basis for decision-making under conditions of uncertainty, and supporting the development of flexible humanitarian stabilization policies (Table 9).

In this context, it is appropriate to integrate the social tension model (1–3) into a specialized analytical platform built on artificial intelligence tools, OSINT analytics, intelligent data analysis (Big Data), and scenario planning.

**Analytical platform for the analysis and management of social tension.** Figure 6 presents a generalized structural scheme of the  $N-CH$  analytical platform, which implements an integrated cycle: “data → analytics → management → stabilization.” The platform combines OSINT sources, AI analytical modules, and Bayesian evaluation and forecasting methods with strategic response mechanisms, enabling it to support state humanita-

rian policy based on analytical signals and quantitative monitoring of social tension.

The development of management policies is based on the concept of controlled corridors of social tension, understood as the “social temperature” of the system, reflecting successive stages of escalation:

1.  $CH [2; 3)$  — controlled excited state: the system is tense but stable;
2.  $CH [3; 4)$  — high tension with localized outbreaks;
3.  $CH [4; 5)$  — pre-shock regime with self-reinforcing network effects;
4.  $CH \geq 5$  — social shock zone, requiring inter-agency stabilization.

Management decisions are formed through a system of formal triggers based on the dynamics of the  $\Delta CH$  indicator and components of the  $N$

Table 9. Recommendations for Monitoring and Controlling the Social Tension

Year	Expectations $CH$	Risks	Recommendations
2025 (2nd half)	~2.9—3.1	Exhaustion, disillusionment	Support for social cohesion, transparent communication
2026	2.0—3.8 (depending on scenario)	Polarization, distrust	Foresight-based governance, real-time social indicators
2027	1.8—4.5 (depending on scenario)	Social explosion	Implementation of a national program to reduce social tension through targeted humanitarian policy

model — expectations  $\frac{O_2 - O_1}{2}$ , agency ( $V_i$ ), and the balance of external influences ( $W_j$ ). This approach is methodologically justified within the framework of quantitative uncertainty management and scenario-based risk governance [21].

**Strategy for controlling and stabilizing social tension in Ukraine.** The formulation of strategic actions is carried out according to the management corridors outlined [22–24]:

1. Corridor 1.  $CH$  [2; 3) — Preventive regime: Systematic public briefings with clear metrics, coordinated communication between central authorities and regions, low-intensity psychosocial support programs, rapid micro-interventions in communities (social infrastructure repairs, microgrants up to 60 days), and basic counter-disinformation measures with “debunking” within 24 hours. Stabilization criteria: reduction of  $CH$  by  $\sim 0.2$  within 21 days, non-negative expectations  $\frac{O_2 - O_1}{2} \geq 0$ , and growth of agency ( $V_i \geq +0.05$ ).

2. Corridor 2.  $CH$  [3; 4) — State of tense adaptation: Daily briefings with an “action plan,” facilitated community dialogues, mobile teams of psychologists, peer-to-peer programs for veterans, targeted financial support for “stress-affected households,” and 100-day employment programs. Information security shifts to a 24/7 mode to neutralize hostile “inputs.” Goal: reverse the trend within 4–6 weeks ( $CH < 3$ , stable decline  $\geq -0.2/28$  days) and improve trust ( $\frac{O_2 - O_1}{2} \geq +0.2$ , increase in  $V_i$ ).

3. Corridor 3.  $CH$  [4; 5) — Pre-shock regime: Establishment of a crisis headquarters with a single information center, twice-daily data updates, deployment of stabilization centers including Mental Health and Psychosocial Support (MHPSS [25]), ultra-fast targeted payments ( $\leq 72$  hours), and enhanced information defense (pre-bunking, combating bot networks). Target: reduce  $CH$  to  $\leq 3.8$  within 30 days, increase  $V_i \geq +0.1$ , decrease negative content by 50%, and cut protest activity by  $\geq 30\%$ .

4. Corridor 4.  $CH \geq 5$  — Shock zone: Inter-agency government coordination is activated; macro-

financial instruments are applied, targeted negotiations with communities are conducted, and critical infrastructure protection is strengthened. Stabilization goals: reduce  $CH$  by  $\geq 0.3$  weekly, return  $CH$  below the threshold of 5 within a month, and normalize cognitive components according to RCCE (Risk Communication and Community Engagement) principles and international psychosocial support standards [26].

Thus, the proposed analytical platform reflects a conceptual-management architecture in which social process analytics are directly integrated into the decision-making loop. Its operation ensures a closed cycle of humanitarian response: from OSINT monitoring and foresight (scenario) analysis to targeted interventions and stabilization of social equilibrium. This makes the platform not only a technological tool but also an institutional mechanism for managing social tension in the dynamic conditions of contemporary Ukraine.

## CONCLUSIONS

1. Based on the modeling of social tension ( $CH$ ) processes in Ukraine in the second half of 2025, a Bayesian-foresight model has been developed for the quantitative assessment and forecasting of societal processes over the medium-term period of 2026–2027. The model integrates the psychological theory of social tension, OSINT analytics, artificial intelligence methods, and scenario analysis, providing a comprehensive representation of social dynamics under conditions of war, economic instability, and evolving social expectations. The modeling results have indicated that in 2025, the level of  $CH$  remains moderate (around 3.0), but shows a tendency to increase due to prolonged military conflict, economic exhaustion, and declining trust in institutions.

2. For the medium-term period (2026–2027), three baseline scenarios of social system development have been identified — A (Controlled Peace), B (Prolonged Stagnation), and C (Escalation and Rupture) — reflecting the variability

of societal dynamics and the dependence of social stability on the effectiveness of state policy, external conditions, and the level of collective expectations:

- ◆ A (Controlled Peace), probability 25%: stabilization, recovery, reduction of  $CH$  to 1.8—2.0;
- ◆ B (Prolonged Stagnation), probability 50%: protracted war, frustration,  $CH \approx 3.5$ —3.8;
- ◆ C (Escalation and Rupture), probability 25%: crisis and social shock,  $CH \approx 4.2$ —4.5.

3. Bayesian evaluation and sensitivity analysis of the  $N$ — $CH$  social tension model confirmed the reliability of the forecasts: the resulting posterior probabilities  $P(A) : P(B) : P(C) \approx 0.25 : 0.52 : 0.23$  closely match the prior probabilities (0.25 : 0.50 : 0.25), indicating the model's stability and its ability to accurately reflect real social dynamics.

4. The results demonstrate the need to establish a national system for strategic monitoring of social tension, combining OSINT tools, artificial intelligence, social network analysis, and foresight methods to detect early signs of societal crises. The proposed model can serve as the core of such a system, enabling:

- ◆ early identification of risk zones ( $CH \geq 5$ );
- ◆ forecasting of social trends;
- ◆ support for decision-making in stabilization, recovery, and public communication efforts.

5. The study has practical significance for national humanitarian policy, as it lays the foundation for a transition from reactive to preventive management of social energy, enhancing Ukraine's resilience, cohesion, and adaptive capacity during wartime and in the post-war transformation period.

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#### БАЕСІВСЬКО-ФОРСАЙТНИЙ ПІДХІД ДО ПЕРЕДБАЧЕННЯ СОЦІАЛЬНОЇ НАПРУЖЕНОСТІ В УКРАЇНІ НА СЕРЕДНЬОСТРОКОВУ ПЕРСПЕКТИВУ

**Вступ.** У період війни та глибоких суспільних трансформацій українське суспільство демонструє високу варіативність соціально-психологічних реакцій, що зумовлює потребу у кількісному вимірюванні соціальної напруженості як індикатора суспільної рівноваги.

**Проблематика.** В умовах швидкоплинних змін традиційні соціологічні методи не забезпечують своєчасного прогнозування кризових процесів, оскільки не враховують нелінійність соціальної динаміки, а також вплив емоційних та інформаційних чинників. Актуальним є створення когнітивно-аналітичної моделі, здатної в режимі реального часу інтегрувати великі обсяги даних, експертні оцінки та баєсівські методи передбачення.

**Мета.** Розробити міждисциплінарний підхід до прогнозування соціальної напруженості в Україні на середньострокову перспективу (2026—2027 рр.) із використанням баєсівських моделей, форсайтного сценарного аналізу, OSINT-моніторингу та інструментів штучного інтелекту.

**Матеріали й методи.** Використано психосоціальну модель N—CH, що поєднує когнітивні, мотиваційні та зовнішньо-оціночні параметри суспільного сприйняття. Емпіричні дані отримано через OSINT-моніторинг платформ GDELT, Google Trends і Media Cloud, а також когнітивний аналіз текстів із застосуванням великих мовних моделей (LLaMA 3).

**Результати.** Розроблено цифрову аналітичну платформу N—CH, яка у режимі реального часу обчислює індикатор соціальної напруженості, виконує тональний та емоційний аналіз публічних комунікацій і формує часові ряди суспільних настроїв. Модель виявила циклічну динаміку напруженості за 2000—2025 рр., з піковим значенням CH  $\approx 9$  у 2022 р. та тенденцією до стабілізації на підвищеному рівні у 2025—2027 рр. Форсайтний сценарний аналіз окреслив три базові сценарії розвитку — контрольований мир, тривала стагнація та ескалація і розрив, імовірності яких оцінено за баєсівським апостеріорним розподілом.

**Висновки.** Запропонований підхід довів ефективність у кількісному прогнозуванні соціальних ризиків і може слугувати основою системи стратегічного моніторингу гуманітарної безпеки. Модель N—CH забезпечує випереджувальне виявлення фаз соціальної нестабільності та підвищує адаптивність державної політики у сфері суспільної стійкості.

**Ключові слова:** соціальна напруженість, баєсівське моделювання, форсайтний сценарний аналіз, OSINT-моніторинг, штучний інтелект, когнітивна аналітика, сценарне планування.