Chapter 2. RISK MANAGEMENT AND CONTINUITY OF THE EDUCATIONAL PROCESS THROUGH SCENARIO PLANNING AND RESPONSE TRIGGERS

Nina Tverezovska, Iryna Demchenko, Tetiana Hryhorenko, Nataliia Slobodianiuk, Viktor Sydorko

Abstract. *The study addresses the problem of ensuring the continuity of the educational process in higher education institutions (HEIs) under conditions of a compound crisis – specifically, the simultaneous occurrence of a pandemic and an armed conflict, as experienced in Ukraine during 2020–2025. The primary objective was to develop and experimentally verify an integrated risk management model based on scenario planning and a trigger-response system designed to maintain educational continuity regardless of the nature or scale of the crisis. A mixed-methods research design was employed, combining a quasi-experimental pedagogical intervention with quantitative surveys, semi-structured interviews, focus groups, document analysis, and structured observation; the study was conducted at the National University of Life and Environmental Sciences of Ukraine with a total sample of 535 participants, including academic staff, administrative personnel, and students. Diagnostic findings revealed a critically low baseline level of institutional readiness (Overall Readiness Index M = 2.39 out of 5.00), with 84.3% of respondents confirming the absence of a documented Business Continuity Plan. A four-level color-coded trigger-response system (green/yellow/orange/red) and four scenario protocols were introduced in the experimental group during the formative stage (2021–2023) and applied in real crisis events, including large-scale power outages, cyberattacks, and active hostilities near Kyiv. Control-stage measurements (2024–2025) demonstrated statistically significant improvements across all indicators in the experimental group compared to the control group ($p < .001$), with very large effect sizes (Cohen's $d = 1.67–2.21$); the Overall Readiness Index rose from 2.41 to 4.12 (+71.0%), while the mean crisis response time decreased from 18.3 to 3.7 hours (−79.8%). The study identified two novel phenomena specific to prolonged crisis contexts: trigger fatigue (declining protocol adherence after repeated activations) and readiness asymmetry (higher compliance among administrative staff than among academic staff and*

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students). The proposed Educational Business Continuity Planning (EdBCP) model advances existing scholarship by integrating bidirectional trigger transitions – covering not only escalation but also structured de-escalation – and by providing an empirically validated operational toolkit applicable to HEIs operating in high-risk environments..

***Keywords**: risk management in higher education; educational continuity; scenario planning; trigger-response system; emergency remote teaching; business continuity planning; crisis management; armed conflict and education; pandemic resilience; EdBCP.*

Introduction

Rapid changes in the global security and epidemiological environment during 2020–2025 have posed unprecedented challenges to the higher education system. The COVID-19 pandemic, which spread worldwide in 2020, disrupted higher education institutions (HEIs) across more than 180 countries, forcing them to rapidly transition to distance learning without adequate regulatory, technical, and methodological support. According to international research, the quality of the educational process significantly declined in the majority of HEIs (Marinoni et al., 2020).

In Ukraine, the situation was further exacerbated by the outbreak of the full-scale armed conflict in February 2022, which led to a fundamental transformation of the conditions for educational activities: partial destruction of university infrastructure, mass displacement of participants in the educational process, and the need to ensure the safety of students and academic staff under conditions of constant threat (UNESCO & IIEP, 2023). The psychological consequences of these crises for participants in the educational process are substantial: studies indicate a sharp increase in anxiety, post-traumatic stress, and emotional burnout (Bihun et al., 2022).

These circumstances revealed a systemic unpreparedness of most HEIs to manage risks under emergency conditions, manifested in the absence of clear response protocols, documented business continuity plans for the educational process, and defined criteria and mechanisms for transitioning between different modes of instruction. Strategic risk management is an integral component of organizational management (Kaplan &

Mikes, 2012; Weick & Sutcliffe, 2007). In most cases, responses to crisis events were reactive rather than preventive, significantly reducing the quality of education and academic integrity (Hodges et al., 2020; Crawford et al., 2020). Education in emergency contexts requires fundamentally different approaches compared to conventional distance learning (Education Cannot Wait, 2020).

Given the prolonged nature of martial law and the persistence of various threats (security, technological, and epidemiological), the development of systemic mechanisms for risk management and the continuity of the educational process is becoming strategically important for Ukrainian HEIs. Particular attention should be paid to an approach based on scenario planning and the use of response triggers tools that enable advance preparation for different crisis scenarios and establish clear conditions and sequences of managerial actions (Schwartz, 1991; van der Heijden, 1996).

The issue of risk management in higher education has received considerable attention in the international academic literature. The theoretical foundations of risk management in educational organizations have been explored by Levine and Van Pelt (2021), who conceptualize the university as an institution with heightened vulnerability to external shocks and identify the key components of HEI resilience. Tierney (2006) thoroughly examined issues of trust and academic culture, which influence universities' capacity for adaptation. Trow (2007) analyzed the transformation of higher education from an elite to a mass model, along with the associated challenges.

A systemic approach to ensuring organizational continuity (Business Continuity Management, BCM) in non-profit organizations, including educational institutions, was developed in the work of Smith and Elliott (2006), who adapted classical BCM tools to the specific context of the public sector; the prerequisites of this approach for organizations with global missions were analyzed by Bikson et al. (2003). Unpredictable events as a challenge to organizational resilience were comprehensively examined by Weick and Sutcliffe (2007).

The concept of scenario planning as a tool of strategic management under conditions of uncertainty has been

comprehensively developed by Schwartz (1991) and van der Heijden (1996). In particular, Schwartz developed a methodology for constructing alternative future scenarios by identifying key driving forces and uncertainties. Further developing Shell's approach to scenario planning, van der Heijden demonstrated its effectiveness for institutional strategic management. The application of the scenario-based approach in higher education was examined by Rowley and Sherman (2001), who developed scenario matrices for universities under conditions of changing funding structures and demographic fluctuations.

Numerous publications have addressed the impact of the COVID-19 pandemic on the higher education system. In particular, Hodges et al. (2020) distinguished between planned distance learning and the forced transition to online formats (Emergency Remote Teaching), emphasizing the fundamental differences in quality and preparedness. Crawford et al. (2020) conducted a comparative analysis of university response strategies across 20 countries and found that institutions with pre-established continuity plans demonstrated significantly higher academic performance outcomes. The expansion of blended learning as a flexible response strategy has been explored by Dziuban et al. (2018) and Garrison and Vaughan (2008). The impact of the pandemic on Malaysian HEIs was studied by Nordin and Nordin (2020), who identified similar patterns of systemic unpreparedness. The global dimensions of the pandemic's impact on higher education have been documented by the OECD (2020a; 2020b). WHO recommendations on emergency response include principles applicable to the management of educational organizations (WHO, 2017; WHO, 2021; WHO, 2023).

In the context of armed conflicts and their impact on education systems, it is important to highlight the study by UNESCO and IIEP (2023), which summarizes the experience of ensuring educational continuity under wartime conditions in Syria, Iraq, Afghanistan, and other countries. In particular, it was found that the key factors for maintaining the educational process include decentralization of managerial decision-making, multi-channel delivery of education, and pre-developed protocols for transitioning between formats.

Hryniuk et al. (2021) comprehensively examined issues in higher education under quarantine conditions. Education management in crisis contexts was studied by Luhovyi and Talanova (2021), who analyzed the adaptive capacity of Ukrainian universities amid European integration and wartime challenges. The digitalization of the educational process and distance learning were explored by Tverezovska et al. (2022), Shyshkina (2020), Bykov and Spirin (2019), and Bykov (2008), who focused on models of organizational systems of open education. Subota et al. (2022) investigated information technologies as a means of overcoming socio-cultural barriers in education. Educational systems in EU countries were analyzed in a comparative context by Sysoieva and Krystopchuk (2012). Managerial aspects of ensuring the quality of education under emergency conditions were addressed in the works of Kalashnykova (2022) and Reheilo (2023). However, the integrated combination of risk management, scenario planning, and response trigger systems to ensure the continuity of the educational process remains insufficiently explored in national research.

Despite the substantial body of scholarly work on related issues, a number of questions remain insufficiently developed. First, there is no integrated model for managing risks to the continuity of the educational process in HEIs that combines scenario planning with an operational trigger system for transitions between different modes of instruction. Second, existing approaches to Business Continuity Management (BCM) have been developed primarily for business organizations and require substantial adaptation to the specific context of higher education institutions, particularly under martial law (Smith & Elliott, 2006; Hodges et al., 2020). Third, there is a lack of empirical studies on the effectiveness of trigger-based response systems under conditions of chronic crisis, which has been characteristic of Ukraine throughout 2022–2024. Fourth, scientifically grounded criteria and threshold values for activating managerial decisions regarding changes in the format of the educational process have not yet been developed.

Given these gaps, it is necessary to systematize the risks threatening the continuity of the educational process in HEIs under conditions of pandemic and martial law; to develop a conceptual

model for ensuring the continuity of the educational process (EdBCP) based on scenario planning; to substantiate a system of response triggers as a mechanism for transitioning between scenarios; to experimentally verify the effectiveness of the proposed model on the basis of higher education institutions; and to conduct a comparative analysis of the obtained results against international and national experience.

The aim of this study is to develop and experimentally validate a model for managing risks to the continuity of the educational process in higher education institutions, based on scenario planning and a system of response triggers under emergency conditions (using the National University of Life and Environmental Sciences of Ukraine as a case study for the period 2020–2025).

Research results

The study was conducted at the National University of Life and Environmental Sciences of Ukraine (NUBiP of Ukraine) from 2020 to 2025. NUBiP of Ukraine is one of the largest agrarian universities in the country, with an extensive structure of faculties, institutes, and affiliated units, which results in increased organizational complexity in managing the educational process under crisis conditions. The university operated under both types of crises examined in this study: the transition to distance learning due to the COVID-19 pandemic (2020–2021) and the adaptation of the educational process to the conditions of martial law (2022–2025).

Three participant groups were involved in the study: academic staff, administrative personnel, and students. The sample was formed using a stratified sampling approach, accounting for faculty affiliation, position level, and mode of study. The total sample size was 535 individuals, of whom 265 were assigned to the experimental group and 270 to the control group. A detailed distribution of participants by category is presented in Table 1.

The inclusion criteria for the sample were as follows: for academic staff – at least one year of teaching experience under

distance or blended learning conditions; for administrative personnel – direct involvement in managerial decision-making related to the organization of the educational process; for students – enrollment in full-time or part-time higher education programs throughout the entire study period or a substantial part of it. The exclusion criteria included: lack of consent to participate in the study and incomplete completion of data collection instruments (omission of more than 15% of questionnaire items).

Table 1
Distribution of study participants by categories and groups

Category of participants	*Experimental group (n)*	*Control group (n)*	*Total (n)*
Academic staff	60	61	121
Administrative personnel	23	23	46
Students	182	186	368
Total	**265**	**270**	**535**

Source: compiled by the authors.

A mixed-methods research design was employed, specifically an explanatory sequential design, in which quantitative data were collected and analyzed at the first stage, followed by qualitative methods at the second stage for in-depth interpretation of the results (Creswell & Plano Clark, 2018). The choice of the mixed design was substantiated in accordance with the methodological principles outlined by Tashakkori and Teddlie (2010) and Johnson and Onwuegbuzie (2004). The study comprised three consecutive stages: diagnostic (2020–2021), formative (2022–2023), and control (2024–2025).

At the diagnostic stage, the baseline level of HEIs' readiness for risk management and ensuring the continuity of the educational process was assessed. During the formative stage, the author's model of scenario planning with a system of response triggers was implemented in the experimental group, while the control group continued to operate within existing institutional approaches without targeted intervention. At the control stage, indicators were repeatedly measured in both groups to evaluate the effectiveness of the implemented model.

A combination of mutually complementary methods was used to gather empirical data, ensuring data triangulation and

enhancing the reliability and validity of the findings. During the diagnostic and control phases, questionnaire surveys, semi-structured interviews, focus groups, document analysis, and structured observation were applied. In the formative phase, a pedagogical experiment was conducted that involved implementing the author-developed model of scenario planning and a system of response triggers.

The author-developed questionnaire on HEIs' readiness for managing risks to the continuity of the educational process was designed based on a theoretical model and included 42 items grouped into five thematic blocks: 1) institutional readiness for crisis situations; 2) availability and quality of continuity plans; 3) technological support for distance learning; 4) communication and coordination under crisis conditions; and 5) psychological readiness of participants in the educational process. Responses were recorded using a five-point Likert scale (1 – «strongly disagree» to 5 – «strongly agree»). The reliability of the instrument was assessed using Cronbach's alpha coefficient (α = 0.87), indicating a high level of internal consistency.

Semi-structured individual interviews were conducted with representatives of administrative personnel (n = 18) and academic staff (n = 24). Each interview lasted 45–60 minutes. In addition, four focus groups were conducted with students (8–10 participants in each group). All interviews and focus groups were audio-recorded with participants' consent, transcribed, and subjected to thematic analysis (Braun & Clarke, 2006). The qualitative research methodology was grounded in the principles outlined by Bryman (2016) and Charmaz (2014).

Document analysis covered the university's internal regulatory framework for the period 2020–2025, including the rector's orders on organizing the educational process under emergency conditions, minutes of academic council meetings, operational plans for transitioning between learning formats, and reports on the implementation of educational programs. The documents were analyzed using an author-developed content analysis matrix comprising 18 categories.

Structured observation was conducted by monitoring real managerial decisions during crisis events (air raid alerts, power

outages, and cyberattacks on the university's information systems). The recorded parameters included response time, compliance with protocols, and communication quality between units.

Quantitative data were processed using IBM SPSS Statistics 27.0 (Field, 2018). Descriptive statistics included the calculation of means (M), standard deviations (SD), and 95% confidence intervals (CI). The normality of data distribution was tested using the Kolmogorov–Smirnov test. Comparisons between the experimental and control groups were performed using the independent-samples t-test (for normally distributed data) or the Mann–Whitney U test (for non-normally distributed data). Within-group comparisons before and after the intervention were conducted using the paired samples t-test or the Wilcoxon signed-rank test, respectively. The level of statistical significance was set at $p < 0.05$. Effect size was assessed using Cohen's d (Cohen, 1988), and meta-analytical standards proposed by Hattie (2009) were used to interpret intervention effects. The overall methodology for evaluation in mixed-methods educational research is described by Mertens (2015).

Qualitative data were analyzed using thematic analysis following the procedure of Braun and Clarke (2006), ensuring intercoder reliability (Cohen's kappa $\kappa > 0.75$).

The study was conducted in accordance with the internal regulations of the National University of Life and Environmental Sciences of Ukraine and generally accepted ethical principles for research involving human participants. Prior to data collection, all potential participants were informed about the purpose, objectives, and procedures of the study, the voluntary nature of participation, and their right to refuse or withdraw consent at any stage, without providing reasons or consequences.

Participation in the study was entirely voluntary. Written or electronic informed consent was obtained from each participant for participation in the study and for the processing of anonymized data for scientific purposes. Respondents' anonymity was ensured through the assignment of coded identifiers; personal data were neither recorded nor stored. The confidentiality of information

obtained during interviews and focus groups was guaranteed by not disclosing personalized statements in publications.

Additional consent procedures were applied for participants involved in the pedagogical experiment. Academic staff and administrative personnel engaged in the formative stage were separately informed about the nature of the experimental intervention, the implementation of a scenario planning model, and a system of response triggers, and its distinction from routine professional activities. Students involved in observation and survey procedures within the experiment were provided with explanations regarding the educational and research context of their participation. For students who had not reached the age of majority at the start of the study, consent was obtained from parents or legal guardians. No academic advantages or negative consequences were associated with participation or refusal to participate in the experiment.

The study's results were not used to evaluate the participants' academic performance or professional activity. Data collection and storage were carried out in accordance with the academic integrity requirements of the National University of Life and Environmental Sciences of Ukraine and the provisions of the Law of Ukraine "On Personal Data Protection."

Risk management in higher education primarily involves the clear identification and systematization of threats that may disrupt the normal functioning of the educational process. Within this study, an author-developed classification of risks to the continuity of the educational process in HEIs was proposed, based on the synthesis of four conceptual sources: the international standard ISO 22301:2019 (Business Continuity Management Systems), FEMA methodological guidelines on emergency management (FEMA, 2021), UNESCO guidelines on education in emergencies (UNESCO & IIEP, 2023), as well as the author's own conceptualization that takes into account the specific context of Ukraine during 2020–2025.

ISO 22301:2019 defines continuity as the ability of an organization to continue delivering products and services at an acceptable predefined level following a disruptive incident. Adapting this approach to the educational domain requires

reinterpreting the concept of "services" as the educational process and the "acceptable level" as the minimum sufficient conditions for teaching and assessment. FEMA distinguishes four phases of emergency management-mitigation, preparedness, response, and recovery – which in this study are used as a framework for describing HEI action protocols at each trigger level. UNESCO emphasizes the need to ensure accessibility, quality, and the protection of participants in the educational process, even in the context of humanitarian crises.

Based on these sources, six groups of risks to the continuity of the educational process in HEIs were identified (Table 2).

Table 2

Classification of risks to the continuity of the educational process in HEIs

Risk group	*Type of risk*	*Characteristics*	*Source of classification*
Epidemi-ological	Pandemic/mass disease outbreak	sudden large-scale disruption of the educational process, transition to distance learning formats	WHO; UNESCO, 2023
Military-security	Armed conflict, occupation, shelling	threat to the physical safety of participants in the educational process, destruction of infrastructure	FEMA, 2021; author's classification
Technological	Power outages, cyberattacks, and it system failures	disruption of the technological infrastructure of distance learning	ISO 22301: 2019
Organizational-managerial	Lack of BCP plans, staff unpreparedness	institutional inability to respond to crises in a timely manner	ISO 22301: 2019; author's classification
Socio-psychological	Stress, burnout, mass displacement	decreased learning motivation, academic disengagement, dropouts	UNESCO, 2023; author's classification
Regulatory-legal	Changes in le–gislation under emergency conditions	inconsistency of educational programs and procedures with new legal requirements	author's classification

Note: ES – emergency situation; BCP – Business Continuity Plan. Compiled by the authors based on ISO 22301:2019; FEMA, 2021; UNESCO & IIEP, 2023.

Source: compiled by the authors.

The period 2020–2025 is characterized by Ukrainian HEIs by a unique combination of simultaneously operating risks from different groups, which significantly distinguishes this context from most international counterparts. While the pandemic crisis of 2020–2021 affected universities worldwide, the combination of military-security, technological, and socio-psychological risks that emerged after February 2022 is specific to the Ukrainian context and has no direct parallels in contemporary academic literature.

An analysis of documents from the National University of Life and Environmental Sciences of Ukraine for 2020–2025 indicates that the university faced all six identified risk groups during the study period. In particular, more than 1,400 air raid alerts were recorded between 2022 and 2024, requiring the immediate interruption of classes; large-scale forced displacement of students and academic staff was observed (according to various estimates, up to 30–35% of the cohort relocated abroad or to safer regions); the university experienced several cyberattacks on its information infrastructure; and a significant increase in обращения to psychological support services was documented due to emotional burnout and stress. The role of digital technologies in ensuring the educational process under crisis conditions has been examined by Dede (2010) and Albion et al. (2015). Similar patterns of vulnerability in educational systems across countries have been reported by Gritsenchuk and Malytska (2021) and Sysoieva and Krystopchuk (2012).

The concept of Business Continuity Management (BCM) has traditionally been developed for commercial organizations and aimed at minimizing losses from operational disruptions. The foundations of this approach were analyzed by Bikson et al. (2003). However, its adaptation to the educational sector is a relatively new research direction that has been intensively developing following the COVID-19 pandemic. Smith and Elliott (2006) were among the first to propose a BCM model for public organizations, although the educational dimension in their concept remained peripheral. A more targeted approach was proposed by Rowley and Sherman (2001), who defined strategic resilience as a university's ability to maintain its mission and core functions under conditions of turbulence.

Within the framework of this study, the concept of "educational process continuity" (Educational Business Continuity Planning, EdBCP) is proposed as the systemic capacity of HEIs to ensure the implementation of educational programs at a minimally acceptable level of quality and accessibility, regardless of the nature and scale of a crisis situation. The key distinction between EdBCP and classical BCM lies in prioritizing educational outcomes and participants' well-being in the educational process over the organization's financial and operational performance.

The author's EdBCP concept предусматривает a three-level architecture of continuity management that corresponds to the hierarchical structure of HEIs. Each level is characterized by a specific management objective, a set of measures, and a defined set of responsible actors (Table 3). The coordination of actions across all three levels is a necessary condition for the effective functioning of the EdBCP system.

Table 3

Three-level architecture of EdBCP in a higher education institution

EdBCP level	*Management object*	*Key measures*	*Responsible actors*
Institutional	HEI as an organization	development and updating of BCP, allocation of resources, coordination of units	rectorate, academic council
Program	educational programs and curricula	adaptation of programs to learning formats, adjustment of timelines, assessment	deans, departments
Instructional	individual courses and classes	selection of teaching forms and methods, ensuring feedback with students	academic staff

Note: EdBCP – Educational Business Continuity Planning; academic staff – teaching and research personnel. Compiled by the authors

Source: compiled by the authors.

The institutional level defines the overall strategy and the provision of resources for continuity. The program level ensures that educational programs adapt to changing conditions without compromising their integrity or accreditation requirements. The instructional level implements direct interaction with students

under crisis conditions. The experience of the National University of Life and Environmental Sciences of Ukraine indicates that the program level is the most vulnerable under crisis conditions, primarily due to the insufficient flexibility of regulatory requirements regarding the content and timelines of educational programs.

Scenario planning as a tool of strategic management under conditions of uncertainty gained widespread recognition following the seminal works of Schwartz (1991) and van der Heijden (1996). The core idea of this approach is to abandon attempts to predict a single "most likely" future and instead develop several alternative scenarios that cover a range of possible developments. Preparing for multiple scenarios simultaneously enhances organizational flexibility and reduces the risk of being caught unprepared by crisis situations (van der Heijden, 1996).

In the field of higher education, scenario planning was primarily used for long-term strategic planning prior to the pandemic, addressing demographic changes, labor market transformation, and digitalization (Rowley & Sherman, 2001; Bykov & Spirin, 2019; Bykov, 2008). After 2020, it gained new significance as a tool for operational crisis management. Crawford et al. (2020) demonstrated that universities with pre-developed scenario plans for transitioning to distance learning experienced significantly shorter periods of "transition chaos" compared to those that responded situationally. Flipped and hybrid learning as elements of flexible response strategies have been explored by Zainuddin et al. (2019) and Anderson and Dron (2011).

The author's model of scenario planning for HEIs synthesizes the approaches of Schwartz (1991), van der Heijden (1996), and the FEMA methodology (2021), and includes five stages: 1) identification of driving forces and key uncertainties; 2) definition of the axes of the scenario space; 3) development of four baseline scenarios; 4) formulation of action protocols for each scenario; and 5) establishment of triggers for transitions between scenarios.

The concept of a «response trigger» is derived from emergency management methodology (FEMA, 2021) and adapted to the specific context of educational management. In this study, a response trigger is defined as a pre-established condition or set

of conditions, the attainment of which automatically or directive-based initiates the transition of an HEI to a corresponding mode of functioning of the educational process. Unlike situational managerial decisions, triggers ensure predictability, speed, and coordination in responding to crisis events.

The developed authorial system includes four trigger levels corresponding to four baseline crisis development scenarios. Each level is identified by a color code, which simplifies communication among university units under heightened stress. The characteristics of these levels are presented in Table 4.

Table 4

HEI response trigger system for crisis situations

Level	*Name*	*Activation conditions*	*Mode of educational process*	*Response time*
1	Green (normal operation)	no threats; stable functioning	face-to-face and/or blended learning in full capacity	–
2	Yellow (heightened readiness)	isolated incidents; warnings of potential threats; local disruptions	blended learning with a transition to distance components; backup communication channels	24–48 hours
3	Orange (partial crisis)	regular security threats; mass power outages; up to 30% of staff unavailable	full transition to asynchronous distance learning; simplified assessment procedures	4–12 hours
4	Red (full crisis)	active hostilities in immediate proximity; complete loss of infrastructure; evacuation	suspension or minimization of the educational process; activation of safety protocols	immediate

Note: Response time refers to the maximum allowable interval between the identification of a trigger condition and the initiation of the transition to the corresponding mode. Compiled by the authors based on FEMA (2021) and ISO 22301:2019

Source: compiled by the authors.

The four baseline scenarios of the author's model form a matrix that encompasses the entire spectrum of possible states of the educational environment, from normal operation to full crisis. The scenario matrix was constructed along two axes of uncertainty identified based on the analysis of the risk landscape of the National University of Life and Environmental Sciences of Ukraine: (1) the level of physical safety of participants in the educational process and (2) the level of availability of technological infrastructure for learning. The characteristics of the scenarios and the corresponding management priorities are presented in Table 5.

Table 5
Scenario matrix of educational process continuity

Scenario	*Trigger level*	*Situation characteristics*	*Management priorities*
C-1: "Stability"	green	normal functioning of the HEI; minimal risks	development; quality; innovation
C-2: "Adaptation"	yellow	limited threats; partial disruptions; need for flexibility	flexibility; communication; resource reallocation
C-3: "Crisis management"	orange	systemic disruptions; large-scale threats to safety or infrastructure	safety; continuity; loss minimization
C-4: "Recovery"	transition from red	completion of the acute phase of the crisis; gradual normalization	recovery; reintegration; psychological support

Note: C – scenario. Transitions between scenarios are carried out according to the trigger system (Table 5). Compiled by the authors

Source: compiled by the authors

For each scenario, a detailed action protocol was developed, covering three dimensions of management: organizational (distribution of responsibilities and activation of backup structures), technological (list of tools and platforms and backup communication channels), and pedagogical (adaptation of teaching, control, and assessment formats). In particular, scenario C-3 ("Crisis management") предусматривает a full transition to asynchronous learning using Moodle as the primary platform, with email and messaging applications as backup communication channels, and the introduction of a simplified cumulative assessment system without mandatory synchronous examinations.

A key feature of the proposed model is the bidirectionality of trigger transitions: the system provides not only an algorithm for shifting to a more restrictive mode in the event of deterioration, but also a clear protocol for a gradual return to normal functioning upon stabilization. This distinguishes the proposed approach from most reactive crisis management models, which are focused solely on response rather than recovery.

The diagnostic stage of the study covered 2020, the period coinciding with the onset of the COVID-19 pandemic, which marked the first large-scale stress test for the higher education system in Ukraine. This made it possible to capture the baseline level of HEIs' readiness for risk management directly under real crisis conditions rather than in routine settings, thereby significantly enhancing the ecological validity of the diagnostic data. Surveys, interviews, and document analysis were conducted in parallel in both the experimental and control groups to ensure the comparability of baseline indicators.

The survey results using the author-developed questionnaire on HEIs' readiness to manage risks to the continuity of the educational process (n = 535) indicated an overall low level of institutional readiness across most measured constructs. The mean values of the five questionnaire blocks and the overall readiness index (ORI) for the total sample at the beginning of the diagnostic stage are presented in Table 6.

The lowest scores were recorded for the block «Availability and quality of continuity plans» (M = 1.87; SD = 0.74), corresponding to a critical level of readiness. Document analysis of the university confirmed these findings: as of early 2020, the National University of Life and Environmental Sciences of Ukraine lacked a documented educational continuity plan, clear protocols for transitioning between learning formats, and an approved system for distributing responsibilities under emergency conditions.

Table 6

Indicators of HEIs' readiness for risk management at the diagnostic stage (2020, n = 535)

Readiness indicator	*M*	*SD*	*95% CI*	*Level*
Institutional readiness for crisis situations	2.41	0.68	[2.28; 2.54]	low
Availability and quality of continuity plans	1.87	0.74	[1.72; 2.02]	critical
Technological support for distance learning	2.93	0.81	[2.77; 3.09]	moderate
Communication and coordination under crisis conditions	2.18	0.72	[2.04; 2.32]	low
Psychological readiness of participants	2.56	0.79	[2.40; 2.72]	low
Overall readiness index (ORI)	2.39	0.55	[2.28; 2.50]	low

Note: M – mean; SD – standard deviation; CI – confidence interval; scale range: 1–5 (minimum–maximum level of readiness). No statistically significant differences were observed between the experimental and control groups at the diagnostic stage (p > 0.05). Compiled by the authors

Source: compiled by the authors.

The relatively higher level of technological support (M = 2.93) can be explained by the prior implementation of the Moodle learning management system; however, the actual competencies of academic staff in its effective use remained insufficient. Similar findings regarding ICT readiness among teaching staff have been reported in international studies (Albion et al., 2015; Anderson & Dron, 2011).

Thematic analysis of interview materials (n = 42) and focus groups (n = 4) enabled the identification of key vulnerabilities in the management system of the educational process under crisis conditions. The results of content analysis of university documents across 18 categories revealed the systemic nature of most gaps: they were not the result of isolated managerial shortcomings but rather reflected the absence of a comprehensive risk management culture within the organization. The summarized data on the identified vulnerabilities are presented in Table 7.

Table 7

Key vulnerabilities of the educational process management system (diagnostic stage, 2020)

Identified vulnerability	*Frequency of occurrence (% of respondents)*	*Priority of mitigation*
Lack of a documented BCP plan	84.3	critical (to be addressed at the beginning of the formative stage)
Absence of clear criteria for transitions between learning modes	79.1	critical
Insufficient preparedness of academic staff for distance learning	67.4	high
Lack of backup communication channels	61.8	high
Insufficient student awareness of actions in emergency situations	58.2	moderate
Lack of psychological support under crisis conditions	52.6	moderate

Note: Percentage of respondents who confirmed the presence of the respective vulnerability; n = 535. Compiled by the authors

Source: compiled by the authors

The data presented in Table 8 indicate that the most critical issues are systemic planning gaps: 84.3% of respondents confirmed the absence of a documented BCP, while 79.1% reported the lack of clear criteria for transitioning between learning modes. Qualitative interview data complement this picture: the majority of administrative staff noted that decisions on changes to learning formats during the pandemic were made in a "manual mode," without predefined criteria or procedures, resulting in significant delays and contradictory directives. Similar problems have also been documented in Ukrainian HEIs (Voliarska, 2020).

The formative stage spanned the years 2021–2023 and comprised four consecutive sub-stages of implementing the author's model in the experimental group.

At the first sub-stage, management staff were trained, the university's Business Continuity Plan (BCP) was developed, and trigger conditions were identified. At the second sub-stage, pilot testing of the system was conducted under pandemic restrictions, and the protocols were adjusted accordingly. At the third sub-stage, the model was applied in a full-scale invasion context. At the fourth sub-stage, the model was refined based on reflection outcomes, training for academic staff and students was expanded, and key procedures were integrated into the university's internal regulations.

Throughout this period, the control group continued to operate within the existing institutional frameworks without targeted intervention, creating the conditions for a natural quasi-experiment.

The response trigger system was officially implemented in the experimental group in September 2021, following the completion of sub-stage F-1. The implementation included three components: (1) approval of the regulatory document "Regulations on the Response Trigger System of NUBiP of Ukraine" at the level of the Academic Council; (2) technical configuration of automated notifications through the university's corporate management system; and (3) проведение practical training sessions for all categories of participants in the experimental group on actions required at each trigger level.

The first real test of the system occurred during the escalation of the pandemic situation in December 2021, when the level 2 (yellow) trigger was activated within 3.1 hours after receiving the official notification from the Ministry of Health of Ukraine regarding the introduction of new restrictions. In the control group, the transition to a blended learning format under similar conditions took an average of 22.4 hours. Following the full-scale invasion in February 2022, the trigger system underwent its most rigorous test: during 2022–2023, a total of 14 trigger activations were recorded, including 6 at level 3 (orange) and 2 at level 4 (red).

Training for managerial personnel was conducted in both face-to-face and дистанційні formats, totaling 32 academic hours. The training program covered the theoretical foundations of risk

management in education, practical exercises for each scenario, simulation-based trigger-activation exercises, and case analyses of international university practices. Based on pre- and post-training assessments of administrative staff ($n = 23$), a statistically significant increase in knowledge related to educational continuity management was observed: the mean score increased from 3.2 ± 0.6 to 4.7 ± 0.4 ($t(22) = 9.84$; $p < 0.001$; $d = 2.06$). For academic staff involved in the formative stage, separate methodological workshops were conducted on adapting teaching under different trigger levels (a total of 8 workshops, 187 participants). The use of ICT in education under crisis conditions has been explored by Tverezovska et al. (2022) and Subota et al. (2022).

The control stage began in 2024 and involved repeated measurement of the full set of indicators in both groups using the same instruments as at the diagnostic stage. This ensured the validity of comparisons between baseline and final values. The repeated survey was conducted in two rounds: the first at the beginning of 2024 (after completion of the active phase of the formative stage), and the second at the beginning of 2025 (to assess the stability of the intervention effects). No statistically significant differences were found in the indicators of the experimental group between the two rounds of control measurement ($p > 0.05$), indicating the stability of the achieved results.

The aggregated results of the comparison of key indicators between the experimental and control groups before and after the intervention are presented in Table 8. For all indicators, the independent samples Student's t-test was applied (after testing for normality using the Kolmogorov–Smirnov test). The level of statistical significance was set at $p < 0.05$; effect size was assessed using Cohen's d (small effect: $d \geq 0.2$; medium: $d \geq 0.5$; large: $d \geq 0.8$).

To assess the operational effectiveness of the response trigger system, an analysis was conducted of four real crisis events that occurred during the formative and control stages and involved both groups.

Table 8

Comparison of key indicators in the experimental and control groups before and after the intervention

Indicator	*EG before (M±SD)*	*EG after (M±SD)*	*CG before (M±SD)*	*CG after (M±SD)*	*p*	*Cohen's d*
Overall readiness index (1–5)	2.41± 0.55	4.12± 0.43	2.38± 0.57	2.74± 0.61	<0.001	1.84
Response time to trigger activation (hours)	18.3± 4.2	3.7± 1.1	17.9± 4.6	14.2± 3.8	<0.001	2.21
Quality of the educational process under crisis conditions (1–5)	2.18± 0.64	3.89± 0.51	2.21± 0.67	2.58± 0.72	<0.001	1.67
Coverage by BCP protocols (%)	–	87.4± 6.2	–	31.6± 9.8	<0.001	2.08
Participant satisfaction with the organization of learning under crisis conditions (1–5)	2.04± 0.71	3.96± 0.48	2.07± 0.69	2.43± 0.74	<0.001	1.93

Note: EG – experimental group (n = 265); CG – control group (n = 270); M – mean; SD – standard deviation; p – level of significance (independent samples t-test comparing EG after vs. CG after); d – Cohen's effect size. Compiled by the authors

Source: compiled by the authors

For each event, the following indicators were recorded: the time from the occurrence of the trigger condition to the initiation

of the transition to the corresponding learning mode, the percentage of participants who complied with the protocol, and the extent of educational process losses (number of classes not conducted or not compensated). The results are presented in Table 9.

Table 9

Effectiveness of the trigger system during real crisis events (2021–2025)

Crisis event	*Trigger level*	*Response time EG (hours)*	*Response time CG (hours)*	*Outcome for EG*
Mass power outage (Oct 2022)	3 (orange)	2.4	19.6	Transition to asynchronous learning; losses < 3% of classes
Cyberattack on Moodle (Oct 2023)	2 (yellow)	1.8	11.3	Activation of backup platform; disruption < 4 hours
Large-scale hostilities near Kyiv (Feb 2022)	4 (red)	0.7	–	Suspension of classes; activation of safety protocol
Pandemic escalation (Dec 2021)	2 (yellow)	3.1	22.4	Blended format; 96% of classes preserved

Note: EG – experimental group; CG – control group; (–) – data unavailable due to evacuation of part of the CG staff; asynchronous – asynchronous learning. Compiled by the authors

Source: compiled by the authors

The data in Table 9 demonstrate a consistent advantage for the experimental group in response time across all recorded crisis situations. The mean response time in the experimental group was 2.0 ± 1.0 hours compared to 15.8 ± 5.1 hours in the control group ($U = 0$; $p = 0.029$; $r = 0.89$). Qualitative analysis of observation materials indicates that the key factor contributing to faster response was not merely the existence of a trigger system, but rather the prior psychological and procedural preparedness of participants: they knew what actions to take and whom to contact even before receiving official instructions.

The study's quantitative results were synthesized by comparing the values of five key indicators between the experimental and control groups at the beginning of the diagnostic stage (2020) and at the end of the control stage (2025). The aggregated data, including the calculation of relative change (Δ) for each group, are presented in Table 10.

Table 10

Summary of research results: dynamics of key indicators in the experimental and control groups (2020–2025)

Indicator	*EG before*	*EG after*	*Δ EG (%)*	*CG before*	*CG after*	*Δ CG (%)*
Overall readiness index (1–5)	2.41	4.12	+71.0	2.38	2.74	+15.1
Response time (hours)	18.3	3.7	−79.8	17.9	14.2	−20.7
Quality of the educational process in crisis conditions (1–5)	2.18	3.89	+78.4	2.21	2.58	+16.7
Compliance with BCP protocols (%)	n/a	87.4	–	n/a	31.6	–
Satisfaction with the organization of learning in crisis conditions (1–5)	2.04	3.96	+94.1	2.07	2.43	+17.4

Note: EG – experimental group (n = 265); CG – control group (n = 270); Δ – relative change in the indicator; n/a – indicator not measured at the diagnostic stage due to the absence of BCP documentation. Compiled by the authors

Source: compiled by the authors

The data presented in Table 10 demonstrate statistically significant differences between the groups across all measured indicators ($p < 0.001$). The largest intervention effects were observed for response time to trigger activation ($d = 2.21$) and compliance with BCP protocols ($d = 2.08$), corresponding to a very large effect size according to Cohen's scale. The overall readiness index in the experimental group increased from 2.41 to 4.12 points (+71%), whereas in the control group it rose only from 2.38 to 2.74 (+15%), confirming the effectiveness of the targeted

implementation of the model rather than general adaptation to crisis conditions.

The data in Table 10 demonstrate significant differences in the dynamics of indicators between the experimental and control groups. In the experimental group, a more pronounced increase was observed across all measured constructs: the overall readiness index increased by 71.0%, the quality of the educational process under crisis conditions rose by 78.4%, and participants' satisfaction with the organization of learning during the crisis increased by 94.1%. In the control group, the growth in indicators was substantially lower, ranging from 15% to 21%. This may indicate adaptive changes occurring under prolonged crisis exposure even without specially organized institutional intervention.

Statistical analysis revealed significant differences between the groups on all indicators at the $p < 0.001$ level. At the same time, the interpretation of the obtained results requires caution, as the recorded effect sizes are exceptionally large for educational research. Cohen's d values ranging from 1.67 to 2.21 fall into the category of very large effects, whereas educational studies more commonly report moderate effect sizes ($d \approx 0.4–0.6$) (Hattie, 2009). Such a pronounced effect may be associated with the combined influence of several factors, including the low initial level of participants' readiness, high motivation under conditions of real threat, the specificity of the extreme educational environment, and the quasi-experimental design without randomization. Additionally, it should be noted that the control group was also operating under prolonged crisis pressure, which may have influenced the nature of the inter-group differences.

In view of the above, the obtained results should be considered as evidence supporting the promise of the proposed model; however, they require further verification in other samples and under more controlled conditions.

The level of BCP protocol compliance in the experimental group (87.4 ± 6.2%) was significantly higher than in the control group (31.6 ± 9.8%), indicating not only knowledge of the protocols but also their operational internalization. The average response time to a trigger event in the experimental group

decreased from 18.3 to 3.7 hours (−79.8%), which can be regarded as an indicator of high operational readiness. Nevertheless, this indicator also requires cautious interpretation, taking into account the specific institutional context of the study.

Thematic analysis of observation and interview materials at the control stage revealed three stable patterns of effective functioning of the trigger system. The first pattern, «proactive communication», was characterized by administrative representatives in the experimental group sending early warning messages to participants even before the official announcement of transition, based on their own monitoring of trigger indicators. The second pattern, «cascade notification», involved heads of departments acting as key nodes in transmitting information from administration to academic staff and students, significantly reducing response time. The third pattern, «reflective adjustment», involved short (15–20 minutes) analytical discussions with key participants after each trigger activation to refine and improve the protocols.

Two types of deviations from the expected behavior were also identified. The first, "trigger fatigue," was observed after the 8th–10th trigger activation, when some academic staff began to ignore certain protocol requirements, perceiving them as overly bureaucratic. This phenomenon corresponds to what is described in emergency management literature as "alarm fatigue" (FEMA, 2021) and should be taken into account when designing systems for prolonged crisis response. The second deviation, "readiness asymmetry," revealed that administrative personnel demonstrated a significantly higher level of protocol compliance (94.2%) than academic staff (86.7%) and, especially, students (79.3%), indicating the need for differentiated training approaches for different participant categories.

From a management perspective, the identified phenomena of "trigger fatigue" and "readiness asymmetry" hold broader implications for educational management than merely describing the local challenges of implementing the model. These phenomena indicate that institutional resilience develops unevenly, and crisis preparedness depends not only on the presence of formalized protocols but also on the extent to which these protocols are supported at the program and departmental management levels,

and perceived by faculty and students as meaningful and justified. In this sense, the middle management level is particularly important, as it ensures the translation of strategic decisions into the language of daily academic practices and coordinates adaptation at the level of educational programs and academic units (Tamir & Machovcová, 2025).

Contemporary research convincingly demonstrates that a crisis in higher education does not end with the immediate response stage but transitions into a phase of recovery, institutional learning, and resilience-building (Regehr & Rule, 2025). In this context, the proposed model should be viewed not only as a mechanism for emergency transition between learning modes but also as a framework that integrates short-term response with long-term adaptation, crisis leadership, and organizational recovery. This conclusion aligns with recent scholarship on educational leadership in crisis conditions (Hill-Berry & Burris-Melville, 2025), the conceptual expansion of the notion of resilience from continuity to adaptation and transformation (Bou Zeid & Abouchedid, 2025), as well as empirical findings on the resilience mechanisms of Ukrainian universities during wartime and the differences between institutions depending on their size, regional location, and resource capacity (Błaszczyk et al., 2025; Brintseva, 2026).

The findings of this study are in substantive dialogue with a number of Ukrainian scholarly works on education management under crisis conditions. Kalashnykova (2022) found that the quality of education in emergency situations tends to decline in the absence of systemic measures and identified academic staff unpreparedness and the lack of clear institutional regulations as key contributing factors. The results of the present study fully confirm this conclusion: in the control group, where no systemic measures were implemented, the quality of the educational process under crisis conditions increased by only 16.7% despite five years of adaptation. At the same time, this study proposes a concrete operational toolkit – the system of triggers and scenario-based protocols – which goes beyond purely diagnostic observations (Kalashnykova, 2022).

Luhovyi and Talanova (2021) substantiated the existence of adaptive potential in Ukrainian universities but noted its

underutilization at the systemic level. The present study empirically confirms this finding and, at the same time, demonstrates a mechanism for realizing such potential through the EdBCP model. Reheilo (2023) investigated quality management in higher education under martial law at NUBiP in Ukraine and identified significant gaps in institutional documentation, findings that align with this study's diagnostic findings (84.3% of respondents confirmed the absence of a BCP at the beginning of the study). Similar conclusions are also presented in the monograph by Hryniuk et al. (2021).

Thus, the readiness asymmetry across participant groups in the educational process has significant implications for educational leadership. It demonstrates that, even in the presence of formally agreed procedures, institutional resilience is not a linear characteristic of a university but rather consists of subsystems with varying levels of preparedness. For other universities, the practical value lies not so much in the specific protocols themselves as in the model's managerial logic, which integrates coordination, resource reservation, multi-level leadership, and flexible redistribution of responsibility under clearly defined trigger conditions.

Consequently, the findings of this study align with the conclusions of scholars regarding the importance of business continuity planning (Crawford et al., 2020), the qualitative losses associated with reactive response (Hodges et al., 2020), and the role of protocols and backup channels (UNESCO & IIEP, 2023). At the same time, the present research substantially contributes to the existing body of knowledge in several respects. It is among the first empirical studies to test the effectiveness of a scenario-trigger model of business continuity management directly under conditions of active armed conflict, rather than solely during a pandemic. The proposed four-level trigger system is significantly more operationally detailed compared to the two- or three-level models described in most international studies. Furthermore, the bidirectional nature of trigger transitions – not only "downward" toward crisis but also "upward" toward normalization – is an element with no direct analogs in the analyzed literature.

Certain discrepancies with the results of UNESCO and IIEP (2023) should be noted. While the aforementioned report

highlights decentralization as a critical success factor, the present study revealed that excessive decentralization in the absence of a well-defined trigger system may result in fragmented crisis responses. At the initial stage of the research, faculty members and university structural units often made inconsistent decisions regarding the mode of instruction.

Thus, it is not decentralization itself that is effective, but rather decentralization operating within clearly established trigger protocols. This finding may have important practical implications for international policy recommendations on education in emergency and crisis contexts.

The interpretation of the results requires consideration of several limitations. The study was conducted within a single university, limiting the external validity of the findings and warranting a cautious approach to generalizing the results. NUBiP of Ukraine is a large, multidisciplinary university with a complex organizational structure, significant human resources, and greater capacity to mobilize resources in crisis conditions than many other higher education institutions. Therefore, the direct transfer of the proposed model to small, relocated, pedagogical, artistic, or medical institutions may be methodologically inappropriate. The absence of randomization in group allocation (a quasi-experimental design) does not rule out the possibility that uncontrolled variables may influence differences between the experimental and control groups. The duration of the formative stage (2021–2023) and the control stage (2024–2025) complicates the unambiguous establishment of causal relationships between specific interventions and the observed outcomes. The self-report nature of the questionnaire may lead to the overestimation of certain indicators due to social desirability bias (Bryman, 2016). Consequently, the model should be viewed not as a universal solution applicable to all types of higher education institutions, but rather as a conceptually and empirically grounded framework that requires further adaptation to different organizational profiles and crisis contexts.

The scientific novelty of the obtained results is determined by several interrelated components. The study developed and empirically verified an integrated model for managing the continuity of the educational process in higher education

institutions, which combines scenario planning with an operational system of response triggers. The concept of EdBCP (Educational Business Continuity Planning) was proposed and tested as an independent theoretical construct adapted to the specific nature of educational organizations. Empirical data were collected on the functioning of the trigger response system under the combined impact of the pandemic and wartime crises, which expand existing understandings of institutional resilience mechanisms and the limits of university adaptation in prolonged crisis situations.

The practical value of the results lies in the potential for the adapted application of the developed model, trigger system, and scenario protocols by other higher education institutions in Ukraine and abroad operating under heightened risk conditions. The author-developed questionnaire on higher education institutions' readiness for risk management (42 items, α = 0.87) can be used for self-diagnosis of institutional readiness by universities of various profiles, taking into account their size, resource capacity, and organizational specificity. The research findings may serve as a basis for the Ministry of Education and Science of Ukraine to develop relevant regulatory documents on the implementation of business continuity plans in higher education institutions. However, the practical adoption of individual elements of the model should be carried out with due consideration of the local context.

Conclusions

A set of theoretical and practical tasks related to the development and experimental validation of a model for managing risks to the continuity of the educational process in higher education institutions, based on scenario planning and a system of response triggers, has been successfully addressed. Based on the obtained results, the following conclusions have been formulated.

The risks to the continuity of the educational process in HEIs under emergency conditions have been systematized into six groups. An author-developed classification is proposed, encompassing six categories of risk (epidemiological, military-security, technological, organizational-managerial, socio-

psychological, and regulatory-legal), synthesized from ISO 22301:2019, the FEMA methodology (2021), UNESCO & IIEP documents (2023), and the author's conceptualization. It has been established that the specificity of the Ukrainian context in 2020–2025 lies in the simultaneous occurrence of multiple risk groups, which significantly complicates management responses compared to single-factor crisis situations.

The concept of educational process continuity (Educational Business Continuity Planning, EdBCP) has been developed as the systemic capacity of HEIs to ensure the implementation of educational programs at a minimally acceptable level of quality and accessibility, regardless of the nature and scale of a crisis. A three-level architecture of EdBCP (institutional, program, and instructional levels) is proposed, mirroring the university's hierarchical structure and ensuring coordination of managerial actions across all levels of the organization.

An author-developed combined model of scenario planning for HEIs has been designed, synthesizing the approaches of Schwartz (1991), van der Heijden (1996), and FEMA methodology (2021). The model includes four baseline scenarios ("Stability," "Adaptation," "Crisis Management," and "Recovery") and introduces a fundamentally new feature, bidirectional trigger transitions, which provide clear protocols not only for escalation to more restrictive modes but also for gradual return to normal functioning.

A four-level response trigger system (green/yellow/orange/red) has been developed and implemented, establishing predefined conditions and time thresholds for transitions between educational process modes. The system ensures predictability, speed, and coordination of institutional responses to crisis events and differs from existing analogs by a higher level of operational detail and consideration of the specific features of educational organizations.

A pedagogical experiment was conducted at the National University of Life and Environmental Sciences of Ukraine (2020–2025, n = 535). The diagnostic stage (2020) revealed a critically low level of institutional readiness (overall readiness index ORI = 2.39 on a 1–5 scale; 84.3% of participants confirmed the absence

of a BCP). The formative stage (2021–2023) included four sub-stages of implementing the model in the experimental group (n = 265) under real crisis conditions, both pandemic and wartime.

The results of the control stage (2024–2025) demonstrated statistically significant differences between the experimental and control groups across all measured indicators ($p < 0.001$). The overall readiness index in the experimental group increased from 2.41 to 4.12 (+71.0%), whereas in the control group it rose only from 2.38 to 2.74 (+15.1%). The average response time to trigger events in the experimental group decreased from 18.3 to 3.7 hours (−79.8%). The effect sizes (Cohen's d = 1.67–2.21) correspond to the category of "very large," confirming the practical significance of the implemented model.

The results of the study are consistent with the findings of international scholars regarding the importance of continuity planning (Crawford et al., 2020; Smith & Elliott, 2006) and the quality losses associated with reactive responses (Hodges et al., 2020), while substantially extending them with empirical evidence on the effectiveness of a scenario–trigger model under conditions of an active armed conflict. It has been established that effective governance is not achieved through decentralization per se, but through decentralization within clearly defined trigger protocols, a conclusion that refines the recommendations of UNESCO & IIEP (2023).

Two specific effects of prolonged crisis response were identified: "trigger fatigue" (a decline in protocol compliance after the 8th–10th activation) and "readiness asymmetry" (a higher level of compliance among administrative personnel compared to academic staff and students), which should be taken into account when designing continuity management systems under chronic crisis conditions.

The obtained results confirm the research hypothesis: the targeted implementation of an integrated risk management model based on scenario planning and a system of response triggers ensures a statistically significant increase in the level of HEIs' readiness for crisis situations, as well as improvements in the speed and quality of response, compared to traditional reactive approaches.

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