“SME perceptions of global risks: Survey-based evidence from Kazakhstan”

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ARTICLE INFO	Assem Nurzhanova and Aigul Kosherbayeva (2025). SME perceptions of global risks: Survey-based evidence from Kazakhstan. *Problems and Perspectives in Management*, *23*(4), 125-146. doi:10.21511/ppm.23(4).2025.10
DOI	http://dx.doi.org/10.21511/ppm.23(4).2025.10
RELEASED ON	Friday, 24 October 2025
RECEIVED ON	Sunday, 18 May 2025
ACCEPTED ON	Monday, 06 October 2025

JOURNAL	"Problems and Perspectives in Management"
ISSN PRINT	1727-7051
ISSN ONLINE	1810-5467
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
42	6	3

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

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SME PERCEPTIONS OF GLOBAL RISKS: SURVEY-BASED EVIDENCE FROM KAZAKHSTAN

Abstract

This study examines how small and medium-sized enterprises (SMEs) in Kazakhstan perceive and prioritize global risks within an evolving resource-dependent economy. SMEs play a vital role in Kazakhstan's economic development but remain highly vulnerable to macroeconomic instability, environmental shocks, and geopolitical uncertainty. The study aims to explore SMEs' perceptions of global risks, assess how well these perceptions align with the World Economic Forum's (WEF) global risk rankings, and identify key issues requiring policy attention.

The paper employs a structured survey and qualitative risk assessment methodology to analyze data collected from 127 SMEs across all 20 regions of Kazakhstan. The survey, conducted in October 2024, included questions on the perceived likelihood and impact of global risks over a 10-year horizon. Risk categories encompassed economic, environmental, geopolitical, societal, and technological domains. Respondents assessed each risk on a five-point scale for both probability and severity.

Findings indicate that inflation and labor shortages are perceived as the most critical risks by Kazakh SMEs, followed by environmental concerns such as extreme weather events and resource depletion. Geopolitical and technological risks were considered important but secondary. A risk matrix was developed to visualize the prioritization of these risks and support policy planning.

The results reveal a significant gap between global risk assessments and localized SME perceptions, underscoring the importance of context-specific risk management strategies. Targeted government interventions in workforce development, financial support, and climate resilience are essential to strengthen the adaptive capacity of SMEs facing global challenges.

Keywords SMEs, global risks, Kazakhstan, perception, inflation, labor, environment, geopolitics

JEL Classification 053, L26, P21

Type of the article: Research Article

Received on: 18th of May, 2025
Accepted on: 6th of October, 2025
Published on: 24th of October, 2025

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Conflict of interest statement:
Author(s) reported no conflict of interest

INTRODUCTION

In today's increasingly volatile global economy, SMEs navigate a complex risk environment shaped by both internal inefficiencies and external market disruptions. While strategic management practices can mitigate internal risks, SMEs remain vulnerable to external factors such as geopolitical uncertainty, financial instability, and legislative changes. This vulnerability is exacerbated by their constrained resources, limited access to financing, and reliance on localized supply networks. These challenges underscore the importance of understanding the risk profiles and adaptive capacities of SMEs.

SMEs are crucial drivers of economic growth, job creation, and innovation in both developed and developing economies. They represent over 99 percent of all registered enterprises worldwide and contribute between 50 and 60 percent of GDP in various regions, playing an indispensable role in building economic resilience (Savlovschi & Robu, 2011, p. 278; Aris, 2007, p. 1). However, their capacity to expand and sustain operations is increasingly threatened by global risks such as

technological disruptions, regulatory changes, financial market volatility, and geopolitical instability. In contrast to large multinational corporations with diversified portfolios and financial buffers, SMEs are inherently more vulnerable to external shocks due to their limited resources, restricted access to credit, and dependence on localized supply chains (Acar & Göç, 2011, pp. 841-842; Smit & Watkins, 2012, p. 5).

In recent years, global economic uncertainty has had a profound impact on SMEs, particularly in resource-dependent economies like Kazakhstan. As the country seeks to diversify its economy beyond oil and gas, it faces several external risks, including geopolitical tensions, currency fluctuations (ADB, 2024, p. 19), and shifting trade relations with major economic partners such as China and Russia. Broader global challenges such as trade disruptions, energy market volatility, and changing investment patterns have further intensified economic pressures in the region (Nyshanbayev et al., 2024, p. 1374; Isenova, 2022). These developments raise a relevant research problem: how SMEs in Kazakhstan, as actors in a resource-dependent and geopolitically exposed economy, perceive global risks and whether their assessments align with international risk frameworks.

While much research has investigated global risks and their impact on multinational corporations, limited attention has been paid to SMEs' risk perceptions and adaptation strategies, particularly in emerging economies. Existing frameworks and global risk reports often overlook the specific concerns of SMEs in contexts with limited diversification and institutional capacity. Given the financial constraints and distinct decision-making structures of SMEs, their ability to assess, manage, and mitigate global risks remains underexplored.

1. LITERATURE REVIEW

In academic discourse, the concept of global risk is developed not only in an applied context but also through theoretical reflections. One of the key contributions to understanding modern risks comes from Beck (1992), who identified new, industrially constructed risks that transcend territorial and local boundaries. This theoretical perspective emphasizes systemic and non-localized threats, especially in the context of globalization, thereby expanding the analytical lens beyond traditional risk management to include sociological and philosophical dimensions of risk (Beck, 1992; Giddens, 1990). Such theoretical grounding is fundamental for understanding the impact of global risks on societies and organizations, including small and medium-sized enterprises (SMEs) operating in interconnected and rapidly changing environments (Power, 2007; Hopkin, 2018).

In addition to theoretical models, one of the most widely used practical tools for identifying and categorizing global risks is the Global Risks Report by the World Economic Forum (WEF), which is based on expert surveys and scenario analysis (WEF, 2025). In this report, global risk is defined as an event or condition that, if it materializes, can cause significant negative impacts across multiple countries or industries over the next ten years. This framework is widely used by governments, transnational corporations, and international organizations for strategic planning and risk management (OECD, 2020; Pettit et al., 2010). Thus, combining theoretical foundations with practical tools enables a comprehensive understanding of global risks.

However, risk perception and management at the SME level differ significantly from that of large organizations. Risk perception among SMEs is often shaped by experiences and a limited amount of available information. Slovic (2000) and Renn (2008) show that risk perception depends on cultural, psychological, and contextual factors. For SMEs, this typically means a focus on short-term and immediate threats, as opposed to long-term strategic risk management practiced by larger firms. This orientation is explained by limited resources and insufficient access to timely information, leading to a reactive rather than proactive approach to risk management (Revell et al., 2010; Eggers, 2020).

Moreover, SMEs face significant barriers to effective risk management, including financial constraints, a shortage of skilled personnel, and limited access to advisory services (J. Crick & D. Crick, 2020; Cowling et al., 2023). The COVID-19 pandemic was particu-

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larly illustrative in this regard, revealing both the adaptive flexibility of SMEs and their vulnerability stemming from the absence of formal contingency planning (Eggers, 2020). These challenges are further exacerbated by macroeconomic factors, particularly in upper-middle-income countries such as Kazakhstan.

Smit and Watkins (2012) provide a thorough analysis of the current state of risk management among SMEs within the South African context. This comprehensive review highlights several critical themes that illuminate the challenges and opportunities faced by SMEs in managing risk effectively. A prominent finding is the widespread absence of formal risk management strategies among SMEs, which is largely attributed to limited access to financial resources, expertise, and institutional support. Consequently, many SMEs operate without structured mechanisms to identify, assess, and mitigate risks systematically. Furthermore, where risk management practices do exist, they tend to be predominantly reactive rather than proactive. That is, SMEs typically respond to risks after their occurrence rather than implementing anticipatory strategies to prevent or reduce potential negative impacts. Smit and Watkins (2012) argue for the urgent need to adopt structured and comprehensive risk management frameworks tailored to the SME context. Such frameworks would facilitate improved risk awareness, promote resilience, and enhance the capacity of SMEs to sustain operations and growth amidst uncertain and dynamic business environments.

The insights from Smit and Watkins (2012) regarding the limited formalization and reactive nature of risk management in South African SMEs resonate closely with the experience of SMEs in Kazakhstan. Similar to South Africa, Kazakhstani SMEs often face resource constraints, insufficient expertise, and institutional barriers that hinder the adoption of comprehensive risk management frameworks. The predominance of reactive risk responses observed in South African SMEs is also evident in Kazakhstan, where SMEs tend to prioritize short-term survival over proactive risk mitigation due to economic volatility and external shocks, including fluctuations in commodity prices and geopolitical uncertainties (Hausmann et al., 2023; Nyshanbayev et al., 2024). Consequently, the call for structured and context-sensitive risk management approaches emphasized by Smit and Watkins (2012) is particularly relevant for Kazakhstan, highlighting the necessity of tailored frameworks that address local institutional, economic, and cultural realities to enhance SME resilience and sustainable growth.

In the context of Kazakhstan, a resource-dependent upper-middle-income economy, these issues take on particular relevance. Macroeconomic volatility linked to fluctuations in oil and gas prices increases the vulnerability of SMEs (Hausmann et al., 2023; ADB, 2024). Additionally, SMEs face inflation, exchange rate instability, supply chain disruptions, and labor market challenges (Ceresa et al., 2025; Nyshanbayev et al., 2024; Berdibekov et al., 2020). Despite the official recognition of SMEs as a key factor in economic diversification, Kazakhstan's government policy mainly focuses on financial support and simplifying administrative procedures, often overlooking the importance of comprehensive risk management and building business resilience (Ministry of National Economy of the Republic of Kazakhstan, 2022; Agaidarov et al., 2023). Meanwhile, environmental risks are becoming increasingly significant, creating a growing need for the integration of sustainable business practices.

In recent years, awareness of the need for sustainable development, including within the SME sector, has been rising in Kazakhstan. Research shows that environmental initiatives, including the adoption of energy-efficient and resource-saving technologies, positively influence the competitiveness and resilience of companies (Pyagay et al., 2025; Tazhibekova & Shametova, 2024). However, the diffusion of such practices remains limited compared to the scale of national sustainable development goals and commitments to achieve carbon neutrality by 2060 (Varol, 2024; President of the Republic of Kazakhstan, 2023).

At the same time, digital transformation is seen as a key factor in increasing SME resilience, providing new tools for risk management through analytics and supply chain optimization. Nevertheless, the development of digital technologies in Kazakhstan's SME sector is slowed by a lack of human capital, cybersecurity concerns, and organizational resistance (OECD, 2023; Omowole et al., 2024). This underscores the need for a holistic approach that combines investment in technology with human capital development.

From a methodological perspective, research on risk perception and management in the SME sector traditionally relies on several key approaches. First, qualitative methods such as in-depth interviews and focus groups are widely used, allowing researchers to capture the subjective aspects of risk perception as well as cultural and psychological factors influencing decision-making (Slovic, 2000; Renn, 2008). Second, quantitative methods, including surveys and statistical analysis, help formalize and compare data on risk perception and management strategies across different sectors and regions (Revell et al., 2010; Eggers, 2020). Additionally, mixed-method approaches are gaining popularity, combining the strengths of both paradigms for a more comprehensive understanding of the topic (Creswell, 2014).

Special attention should be paid to the methodologies used by international organizations such as the World Economic Forum (WEF) and the Organisation for Economic Co-operation and Development (OECD). WEF, for example, employs a comprehensive approach based on expert surveys and scenario analysis to identify and rank global risks by likelihood and potential impact (WEF, 2025). This method provides a systemic understanding of risks affecting multiple countries and sectors and is widely applied for strategic planning at the national and international level. Similarly, the OECD develops recommendations and policies based on macroeconomic data analysis and the evaluation of support measures for SMEs in times of crisis, including digital transformation and sustainable development (OECD, 2020; OECD, 2023).

However, when applying these methodologies in the context of Kazakhstan, an upper-middle-income country, certain specific factors must be considered. First, WEF's expert surveys may be limited in representativeness for SMEs due to restricted access to experts and high-quality information. Second, OECD recommendations, often designed for developed economies with well-established institutional frameworks, require adaptation to Kazakhstan's institutional development stage and cultural characteristics (Nyshanbayev et al., 2024). Moreover, relying exclusively on macro-level data and general policy tools without considering local context and SME-level micro perspectives may result in incomplete assessments and less effective strategies.

Therefore, the most promising approach appears to be a combination of methodologies: using WEF and OECD frameworks as a foundation for general strategy development, complemented by qualitative research that takes into account the specificities of the Kazakhstani market, institutional limitations, and cultural dimensions of risk perception. Such an adaptation would enable a deeper and more relevant understanding of risks and improve managerial decision-making for SMEs, thereby contributing to sustainable development and economic diversification in an upper-middle-income context.

International organizations such as UNDP, the World Bank, and the Asian Development Bank support programs aimed at enhancing SME resilience and risk management. However, in upper-middle-income countries, these initiatives often face institutional fragmentation, limited reach, and insufficient monitoring, which reduces their effectiveness (Agaidarov et al., 2023; EBRD, 2023; ADB, 2024). Consequently, there is a need for more coordinated and context-sensitive support programs.

Comparative analyses of Central and Eastern European countries show that the maturity of the business environment and infrastructure directly affects SMEs' ability to manage risks effectively (Belu et al., 2023). These lessons are particularly relevant for Kazakhstan and other countries in the region, highlighting the importance of institutional capacity building and the creation of a supportive environment for SMEs.

Nonetheless, despite a large body of research on global risks and their management at the macro level, there remains a significant gap in studying the specificities of risk perception and management among SMEs in upper-middle-income countries such as Kazakhstan. Existing global frameworks and recommendations often fail to account for the unique institutional, economic, and cultural factors that influence SMEs.

Accordingly, an urgent task is to adapt global risk management models to the realities and needs of SMEs in upper-middle-income economies. The objective of this study is to conduct a comprehensive analysis of global risk perceptions and risk management practices among SMEs in Kazakhstan, an upper-middle-income, resource-dependent economy,

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and to identify opportunities for developing more effective and context-sensitive strategies for resilience and competitiveness.

Thus, this study aims to address existing knowledge gaps by providing practical recommendations and methodological foundations for designing effective policies to support and sustainably develop the SME sector in the context of a dynamically changing global and local risk environment.

2. METHODS

Based on the framework outlined by the World Economic Forum (WEF, 2025), this study uses a qualitative risk assessment (QRA) approach to facilitate comparative analyses with results from global risk reports. QRA remains one of the most widely used methodologies in risk analysis due to its efficiency in implementation and relatively low complexity (Tiusanen, 2017, pp. 465-466). Using categorical scales such as low, medium, and high, QRA evaluates potential probabilities and outcomes. This method relies on the subjective probability and impact evaluations of experts and decision-makers. Although subjectivity in QRA may introduce cognitive biases and heuristic influences that could compromise reliability and accuracy (Talbot, 2011, p. 5), it remains a prevalent method for organizing risk evaluations and setting priorities. In qualitative risk assessment, probabilities and effects are represented in a risk matrix, a visual tool that assesses, prioritizes, and rates risks according to their position. Color coding is frequently used to indicate the severity and importance of each risk. Additionally, the risk matrix approach is often employed to highlight potential risk controls and document inherent, current, and target risk levels (Hopkin, 2012, p. 366). The risk matrix is a key tool for guiding risk management strategies. High-probability risks with high impact in the upper right corner (red) require immediate action, while lower (green) and moderate (orange/yellow) risks are less urgent but still require regular monitoring and reassessment.

The data were collected using a structured questionnaire developed specifically for this study. The instrument included 20 questions organized into three parts: (1) general business characteristics (firm size, age, sector, region, and participation in international trade), (2) risk perception by category, and (3) evaluation of the likelihood and impact of global risks over a ten-year horizon. Questions were grouped by risk domain: economic, environmental, geopolitical, societal, and technological, following the WEF classification. Respondents rated the likelihood of each risk occurring in Kazakhstan and its potential impact using five-point Likert scales ranging from "very unlikely" (1) to "very likely" (5), and from "minimal" (1) to "catastrophic" (5), respectively.

The questionnaire was constructed based on a review of recent academic literature and the structure of the WEF global risk framework. Question formulation prioritized clarity, comparability, and local relevance. To validate content and ensure clarity, the draft questionnaire was pilot-tested on five SMEs, after which minor adjustments were made to improve wording. The final version was distributed via Google Forms and disseminated through email lists provided by regional business associations and SME support programs.

The survey was conducted from October 1 to October 31, 2024. A total of 1,100 invitations were sent, and 127 fully completed responses were received, yielding a response rate of approximately 11.5%. The sample includes SMEs from all 20 administrative regions of Kazakhstan, providing comprehensive geographic representation.

The classification of SMEs followed Article 24 of the Entrepreneurial Code of Kazakhstan (The Government of the Republic of Kazakhstan, 2015). Respondent enterprises were categorized as shown in Table 1.

Table 1. Categories of SMEs in Kazakhstan

Enterprise Type	Number of Employees	Annual Revenue (approximate USD equivalent)
Micro	≤ 15	≤ 262,000
Small	≤ 100	≤ 2.62 million
Medium	≤ 250	≤ 26.2 million

Participation in the study was fully voluntary. Respondents were informed of the academic nature of the research and provided informed consent at the start of the questionnaire. No personally identifiable information was collected, and the dataset was anonymized before analysis. As the research did not involve vulnerable populations or sensitive data, formal ethics approval was not required under national research guidelines. Nonetheless, ethical research practices were strictly observed throughout the process.

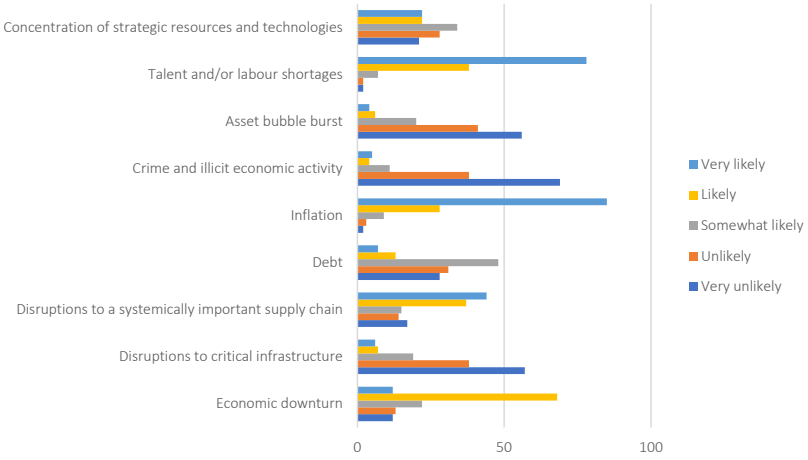
The full version of the questionnaire used in this study is provided in Appendix A. This is the first and only publication based on this dataset; the data have not been used in prior publications.

3. RESULTS

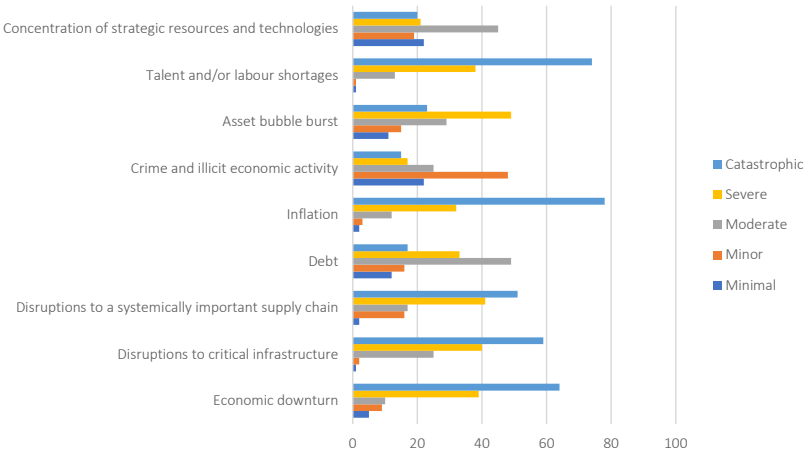
The data collected and the applied methodology analyzed respondents' perceptions of the likelihood and impact of global risks. Based on these assessments, risk values were calculated using a multiplicative risk scoring model (Likelihood × Impact), and a corresponding risk matrix was constructed. The findings indicate that most surveyed SMEs in Kazakhstan perceive global economic risks as highly probable.

3.1. Economic risks

Figure 1a presents SMEs' assessments of the probability of various economic risks, with inflation



(a) Perceived probability of global economic risks



(b) Impact of global economic risks

Note: Inflation and skilled labor shortages emerge as top concerns.

Figure 1. Perceived probability (a) and impact (b) of global economic risks among surveyed SMEs in Kazakhstan

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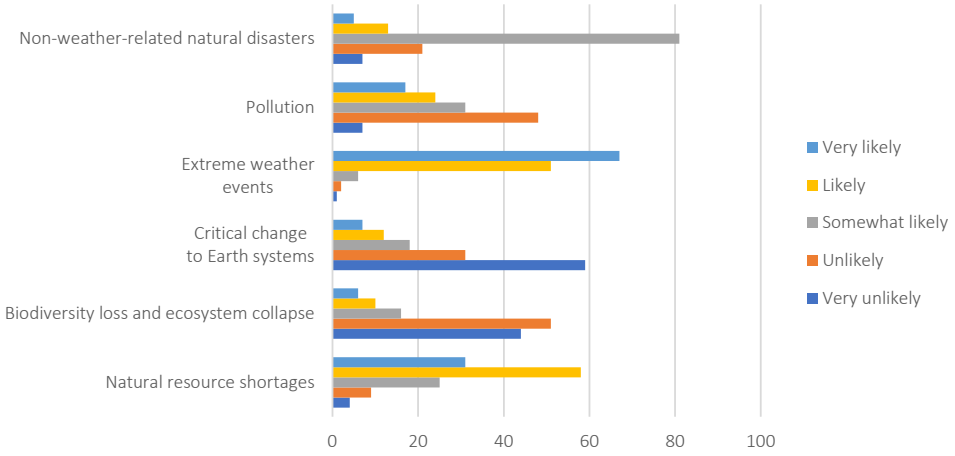
and talent shortages identified as the most likely threats. These reflect Kazakhstan's persistent macroeconomic challenges. Figure 1b shows that these same risks are also perceived to have the highest impact, alongside the risk of economic downturn. Supply chain disruptions and concerns about recession also rank highly, likely influenced by ongoing geopolitical instability that disrupts market access and business continuity.

3.2. Environmental risks

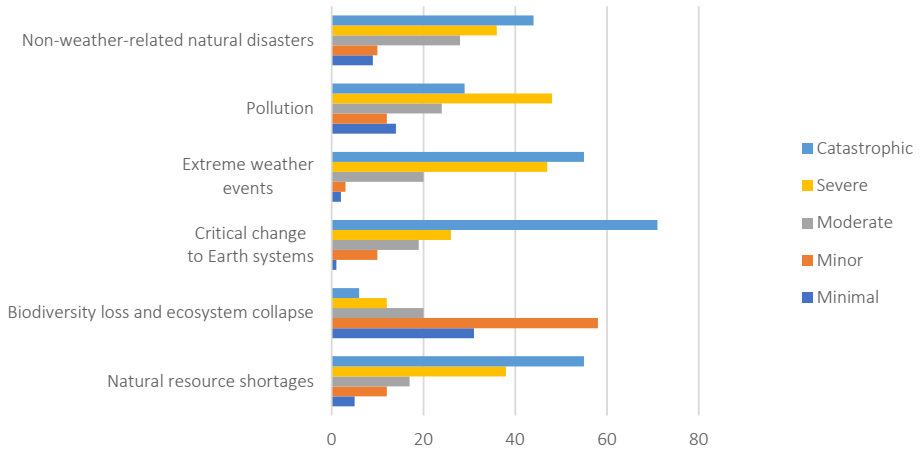
As shown in Figure 2a, extreme weather events and natural resource shortages (e.g., oil) are viewed as highly probable. These concerns reflect Kazakhstan's vulnerability to climate change, environmental degradation, and natural disasters (World Bank, 2017). Figure 2b reveals that extreme weather and critical changes to Earth systems (e.g., climate tipping points) are expected to have the greatest impact. The prominence of these risks is partly influenced by the catastrophic flooding in March 2024 (Akorda, 2024), which directly affected SMEs across multiple regions.

3.3. Geopolitical risks

Figure 3a shows that geo-economic conflict ranks highest among geopolitical threats in terms of probability, reflecting concerns over trade tensions, shifting alliances, and regional instability. Figure 3b identifies geopolitical conflict and economic downturn as the most impactful threats.



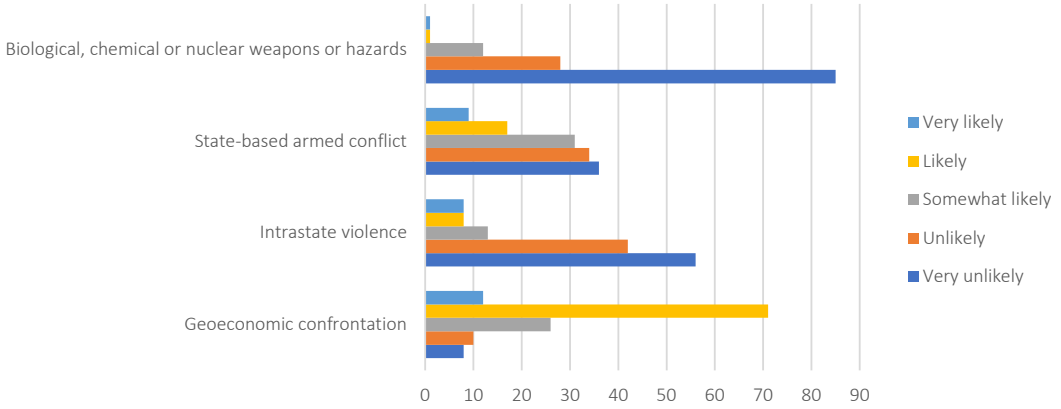
(a) SMEs' perceived likelihood of environmental risks



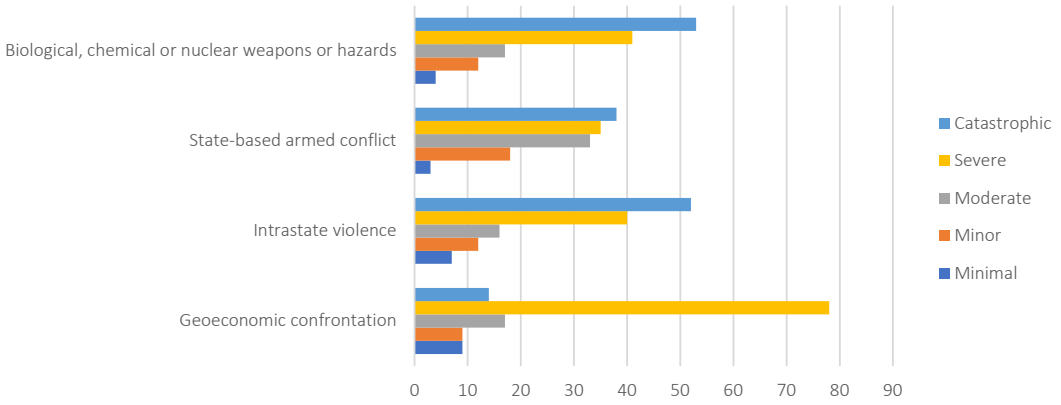
(b) SMEs' impact of environmental risks

Note: Climate-related hazards dominate both dimensions.

Figure 2. SMEs' perceived likelihood (a) and impact (b) of environmental risks



(a) Anticipated probabilities of global geopolitical risks



(b) Projected consequences of global geopolitical risks

Figure 3. Anticipated probabilities (a) and projected consequences (b) of global geopolitical risks

Ongoing regional tensions have had indirect consequences on Kazakhstan through market volatility, affecting cross-border trade and supply chain resilience.

3.4. Societal risks

According to Figure 4a, key societal risks include inequality and lack of economic opportunity, which reflect deeper structural issues in Kazakhstan's socio-economic landscape. Figure 4b highlights that these risks are seen to impact health, well-being, and labor market inclusion. These insights underscore the systemic vulnerabilities in public health infrastructure and economic participation.

3.5. Technological risks

As seen in Figure 5a, cyber espionage and misinformation/disinformation are among the most probable technological risks. These concerns reflect SMEs' increasing digital dependency. Figure 5b shows that cybersecurity failures and adverse outcomes of AI technologies are considered to have the most severe consequences, suggesting a growing awareness of the risks posed by technological transformation without adequate governance or resilience planning.

3.6. Quantitative analysis of risk scores

Table 2 presents the mean values of risk probability and impact, as assessed by SMEs, alongside their calculated risk scores (Likelihood × Impact). The top-ranked risks include inflation, labor shortages, and extreme weather events, all of which score significantly higher than other risk factors. These results illustrate SMEs' prioritization of macroeconomic instability and climate resilience. In contrast, several geopolitical and societal risks appear lower on the list, suggesting a focus on immediate operational challenges.

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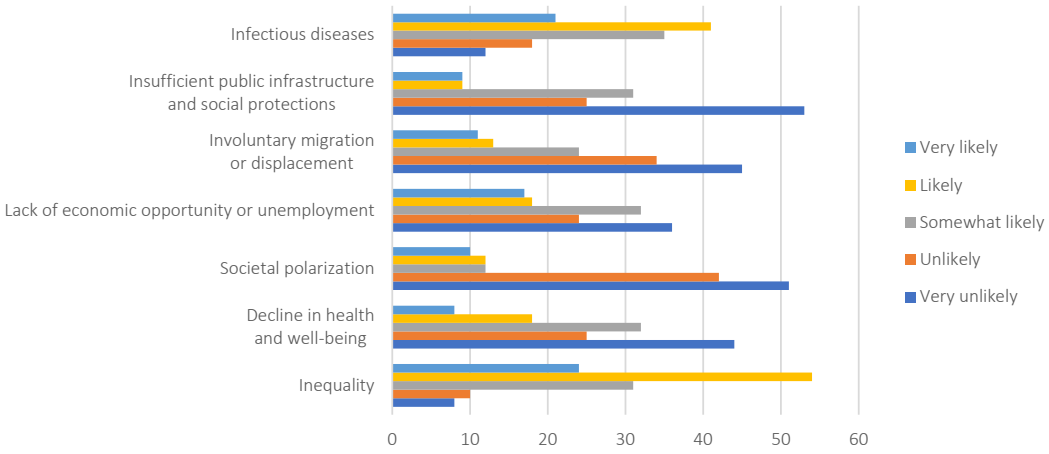
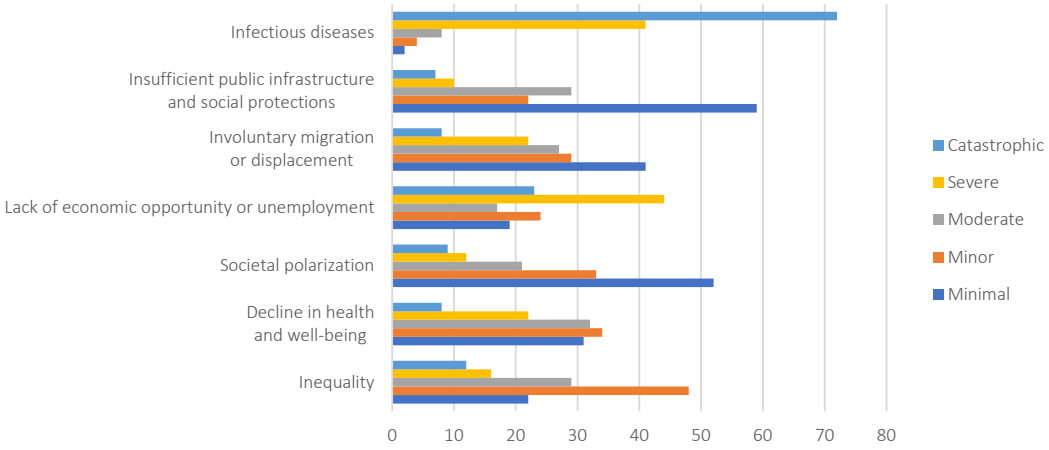


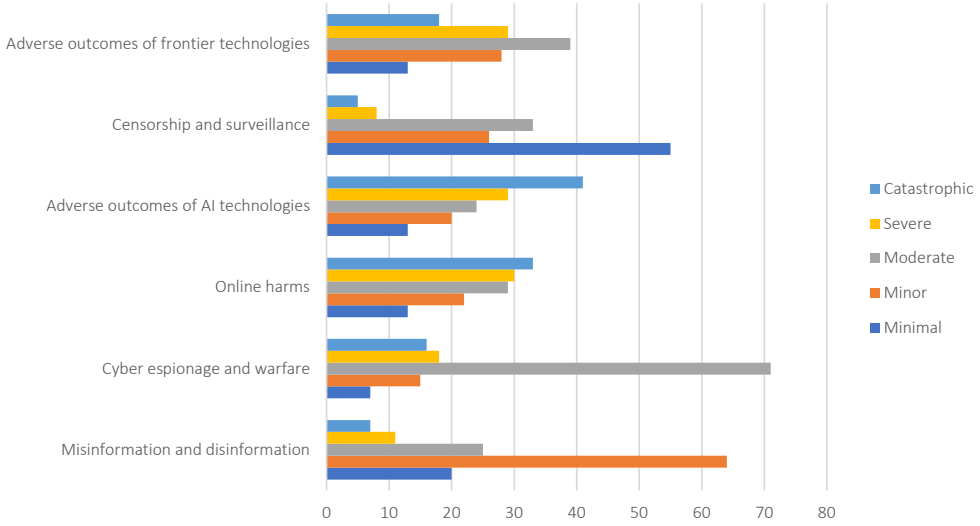
(a) Likelihood of societal risks



(b) Impact of societal risks

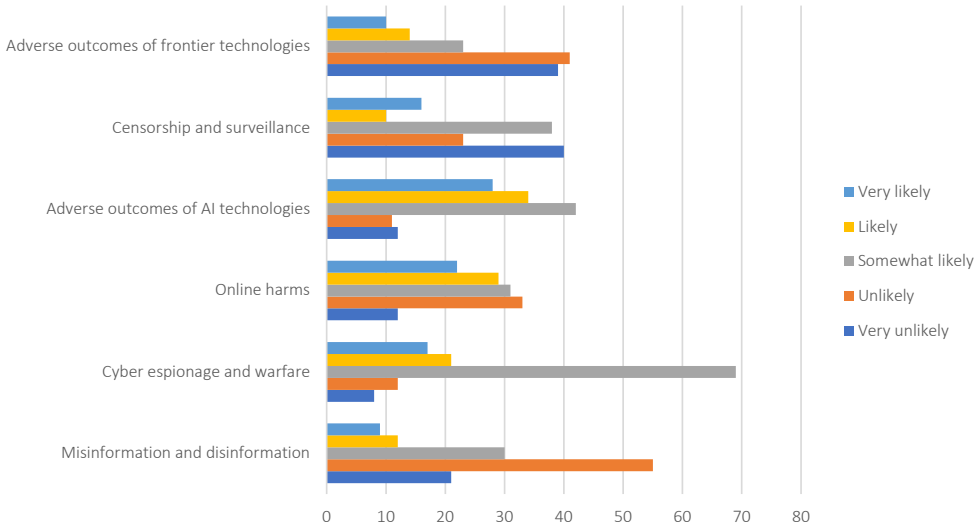
Note: Social inequality and unemployment are key concerns.

Figure 4. SMEs' assessments of the likelihood (a) and impact (b) of societal risks



(a) Perceived likelihood of global technological risks

Figure 5. Perceived likelihood (a) and impact (b) of global technological risks



(b) Impact of global technological risks

Note: Cybersecurity and AI-related challenges dominate the risk landscape.

Figure 5 (cont.). Perceived likelihood (a) and impact (b) of global technological risks

Table 2. Average likelihood, impact, and combined risk scores for global risks

Risk category	Risk subcategory	Likelihood	Impact	Risk (Likelihood × Impact)	Rank
Economic	Economic downturn	3.43	4.17	14.30	7
	Disruptions to critical infrastructure	1.95	4.21	8.23	18
	Disruptions to a systemically important supply chain	3.61	3.97	14.31	6
	Debt	2.53	3.21	8.12	19
	Inflation	4.50	4.43	19.93	1
	Crime and illicit economic activity	1.72	2.65	4.56	31
	Asset bubble burst	1.91	3.46	6.59	23
	Talent and/or labor shortages	4.48	4.44	19.90	2
	Concentration of strategic resources and technologies	2.97	2.98	8.86	13
Environmental	Natural resource shortages	3.81	3.99	15.21	4
	Biodiversity loss and ecosystem collapse	2.08	2.24	4.66	29
	Critical change to Earth systems	2.03	4.23	8.59	15
	Extreme weather events	4.43	4.18	18.50	3
	Pollution	2.97	3.52	10.45	10
	Non-weather-related natural disasters	2.91	3.76	10.91	9
Geopolitical	Geo-economic confrontation	3.54	3.62	12.83	8
	Intrastate violence	1.98	3.93	7.77	21
	State-based armed conflict	2.44	3.69	8.99	12
	Biological, chemical, or nuclear weapons or hazards	1.46	4.00	5.86	26
Societal	Inequality	3.60	2.59	9.32	11
	Decline in health and well-being	2.38	2.54	6.05	24
	Societal polarization	2.12	2.16	4.57	30
	Lack of economic opportunity or unemployment	2.65	3.22	8.55	16
	Involuntary migration or displacement	2.30	2.43	5.58	27
	Insufficient public infrastructure and social protections	2.18	2.09	4.55	32
	Infectious diseases	3.32	4.39	14.60	5
Technological	Misinformation and disinformation	2.47	2.38	5.88	25
	Cyber espionage and warfare	3.21	3.17	7.83	20
	Online harms	3.13	3.38	8.35	17
	Adverse outcomes of AI technologies	3.43	3.51	8.68	14
	Censorship and surveillance	2.52	2.07	5.12	28
	Adverse outcomes of frontier technologies	2.33	3.09	7.63	22

Note: N = 127 SMEs. Risk scores reflect the product of average likelihood and impact on a 1–5 Likert scale.

http://dx.doi.org/10.21511/ppm.23(4).2025.10

3.7. Top 10 global risks

Table 3 summarizes the top 10 risks based on the separate rankings of likelihood and impact. Consistent with earlier findings, inflation and labor shortages dominate both lists. Environmental and economic risks such as extreme weather, resource depletion, and supply chain disruption also feature prominently. The inclusion of infectious diseases reflects continued concerns about public health crises, particularly in a post-pandemic and disaster-prone context.

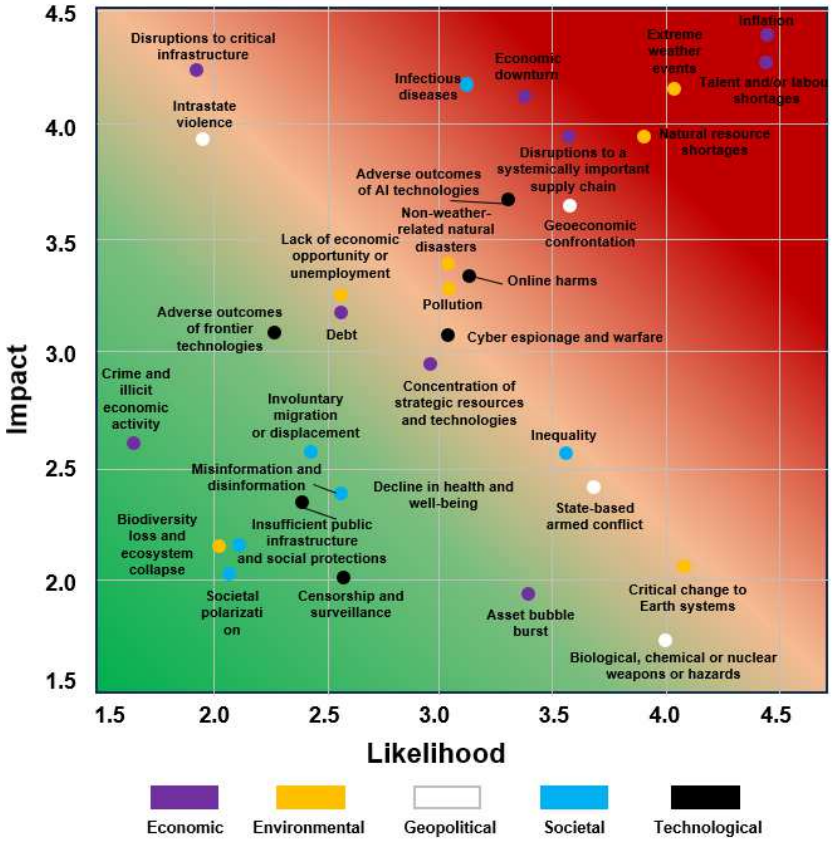
3.8. Risk matrix

A qualitative risk matrix was constructed to visualize the relationship between average likelihood and impact values for all 32 risks. The horizontal axis represents likelihood, while the vertical axis represents impact. Risks falling in the upper-right

Table 3. Top 10 risks by likelihood and impact, based on SME assessments

Rank	Likelihood	Impact
1	Inflation	Talent and/or labor shortages
2	Talent and/or labor shortages	Inflation
3	Extreme weather events	Infectious diseases
4	Natural resource shortages	Critical change to Earth systems
5	Disruptions to a systemically important supply chain	Disruptions to critical infrastructure
6	Inequality	Extreme weather events
7	Geo-economic confrontation	Economic downturn
8	Economic downturn	Biological, chemical, or nuclear weapons or hazards
9	Infectious diseases	Natural resource shortages
10	Pollution	Disruptions to a systemically important supply chain

Note: Economic, environmental, and health-related risks dominate the rankings.



Note: High-risk items (red quadrant) include inflation, labor shortages, and climate hazards.

Figure 6. Risk matrix plotting average likelihood and impact values for global risks

quadrant (shaded red) are considered high-priority threats, requiring immediate mitigation. These include inflation, labor shortages, and extreme weather events. Risks in the lower-left quadrant (green) represent low-likelihood, low-impact threats, and are deprioritized accordingly.

The findings of this study highlight several critical risk perceptions among SMEs in Kazakhstan. Foremost, inflation and labor market shortages consistently emerged as the most significant threats, both in terms of perceived likelihood and potential impact. These challenges reflect persistent macroeconomic pressures and structural inefficiencies in the national labor market. In parallel, environmental risks, particularly those associated with extreme weather events, have gained heightened importance, especially in the aftermath of the catastrophic floods that occurred in early 2024. This shift underscores a growing awareness among SMEs of climate-related vulnerabilities and their disruptive potential. While geopolitical risks, such as geo-economic conflict and regional instability, are acknowledged, they appear secondary to more immediate operational and financial threats. This may reflect SMEs' localized operational focus and limited exposure to international political dynamics. Furthermore, technological threats, including cybersecurity vulnerabilities and adverse outcomes of AI technologies, are increasingly recognized, suggesting a nascent but rising concern over digital risk preparedness. Finally, the risk matrix developed in this study offers a valuable decision-making tool, enabling SMEs to prioritize resilience strategies and allocate resources effectively toward the most pressing external threats.

4. DISCUSSION

This study provides valuable insight into how SMEs in Kazakhstan perceive and prioritize global risks. Overall, global risks are recognized as significant challenges. The average probability rating across all risk types was 2.82, while the average impact rating was 3.36, highlighting SMEs' awareness of potential external disruptions. However, their risk prioritization is heavily influenced by immediate, tangible concerns.

Inflation and labor shortages emerged as the top threats, scoring the highest in both likelihood and impact (risk scores of 19.93 and 19.90, respectively). These findings align with Kazakhstan's current macroeconomic climate, where inflationary pressures, driven by regional geopolitical tensions and global supply chain disruptions, have eroded purchasing power and raised operational costs (Latham & Sundeen, 2022). SMEs, often operating with limited financial reserves, are especially vulnerable to such volatility. Meanwhile, persistent labor shortages reflect a structural misalignment between education outputs and labor market needs, particularly in technical and vocational sectors (Berdibekov et al., 2020, p. 15).

Environmental risks also rank high in perceived likelihood and impact. Extreme weather events (18.50) and natural resource shortages (15.21) are pressing concerns, reinforcing Kazakhstan's known vulnerability to climate-related events such as droughts and floods (Salnikov et al., 2023). The devastating floods in March 2024 have intensified awareness among SMEs about environmental risks, particularly for businesses in agriculture, logistics, and extractive industries (Akorda, 2024). This trend is further supported by long-term concerns over oil depletion, which threatens both fiscal sustainability and energy security (Aitzhanova et al., 2015, pp. 179-180).

Interestingly, geopolitical risks, while acknowledged, did not dominate the top risk rankings. For instance, geo-economic confrontation was rated eighth overall, and other political risks like state-based armed conflict or intrastate violence were ranked much lower. This suggests that although SMEs recognize the broader impact of conflicts and international tensions, they may perceive such risks as more distant or less controllable than domestic economic threats. This perception gap may indicate a lack of robust geopolitical foresight mechanisms, a deficiency that could be addressed through policy interventions, training, and institutional support.

A notable divergence also emerges between this study's findings and those of global frameworks such as the WEF (2025) Global Risks Report. The WEF emphasizes systemic risks like biodiversity loss, geopolitical fragmentation, and

http://dx.doi.org/10.21511/ppm.23(4).2025.10

digital misinformation, which are more abstract or long-term for Kazakhstani SMEs. Instead, local firms prioritize inflation, supply chain disruptions, and skilled labor shortages. This mismatch underscores the importance of contextualizing global risk assessments, ensuring that international frameworks reflect the local realities of SMEs in emerging economies.

Technological risks, including cybersecurity threats, AI-related harms, and online disinformation, were acknowledged but ranked relatively lower in both probability and impact. For instance, cyber espionage received a risk score of just 7.83. This may reflect the limited digital maturity of many Kazakhstani SMEs and a general lack of preparedness in managing digital threats. While this finding may indicate current under-exposure to cyber risk, it also signals a potential vulnerability should digital transformation accelerate without corresponding improvements in cybersecurity infrastructure.

Social risks, such as inequality, censorship, and societal polarization, were also considered less pressing. Most SMEs in Kazakhstan are locally focused and do not directly engage with politically sensitive sectors. Therefore, these risks may be perceived as background factors, rather than immediate operational threats.

Finally, while this study sheds light on localized risk perceptions, several limitations should be noted. First, the sample size, though regionally representative, is relatively small ($N = 127$), which may limit the generalizability of findings. Second, the results are based on subjective assessments, which can be influenced by personal experience or recent events such as the 2024 March floods. Third, the Qualitative Risk Analysis (QRA) method provides useful prioritization but lacks the precision of advanced quantitative risk modeling. Lastly, the data reflect a single point in time (October 2024); as the risk landscape evolves, so too may SME perceptions.

CONCLUSION

This study examined how small and medium-sized enterprises (SMEs) in Kazakhstan perceive and prioritize global risks across economic, environmental, geopolitical, societal, and technological domains. The findings reveal that economic instability, particularly inflation and labor shortages, represent the most pressing concerns for SMEs, followed closely by climate-related threats, such as extreme weather events and resource scarcity. These risks were perceived as both highly probable and highly impactful, highlighting the significant pressures confronting SMEs in Kazakhstan's rapidly evolving risk landscape.

The risk matrix developed in this study provides a visual and analytical tool for risk prioritization, enabling SMEs to focus on the most immediate threats while maintaining awareness of less urgent but still significant issues. The alignment of SME perceptions with actual recent events, such as the 2024 March floods, underscores the relevance of integrating real-time environmental data into strategic planning processes.

While geopolitical and technological risks were acknowledged, they were generally ranked lower, suggesting a need for improved strategic foresight and digital risk awareness within the SME sector. This points to an opportunity for public and private stakeholders to support SMEs through targeted training, risk literacy programs, and capacity-building initiatives that enhance resilience and preparedness.

Ultimately, this study contributes to a more nuanced understanding of risk perception among SMEs in Kazakhstan. It emphasizes the importance of proactive risk management as a core component of business strategy, particularly amid growing global uncertainty. Future research and policy should build on these findings to develop more adaptive, inclusive, and forward-looking risk frameworks that support SME sustainability and competitiveness in the face of systemic change.

AUTHOR CONTRIBUTIONS

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APPENDIX A

Survey for assessing and analyzing global risks for SMEs in Kazakhstan

Dear Entrepreneurs,

We are conducting a study to assess global risks and their potential impact on small and medium-sized enterprises (SMEs) in Kazakhstan.

Your responses will help us gain a better understanding of the challenges faced by businesses in our country. The survey will take no more than 10 minutes to complete.

We guarantee that all information provided will remain confidential and will not be shared with any third parties without your explicit consent.

Thank you in advance for your participation!

1. What is the primary business activity of your enterprise?

a) Agriculture, forestry, and fishing
b) Mining and quarrying
c) Manufacturing
d) Construction
e) Wholesale and retail trade; repair of motor vehicles and motorcycles
f) Transportation and storage
g) Accommodation and food service activities
h) Information and communication
i) Financial and insurance activities
j) Real estate activities
k) Professional, scientific, and technical activities
l) Education
m) Human health and social work activities
n) Arts, entertainment, and recreation
o) Electricity, gas, steam, and air conditioning supply
p) Water supply; sewerage, waste management, and remediation activities
q) Other service activities

2. What is the size of your enterprise?

a) Micro (1–15 employees)
b) Small (16–100 employees)
c) Medium (101–250 employees)

3. In which region of Kazakhstan is your enterprise registered?

a) Abai
b) Akmola
c) Aktobe
d) Almaty Region

e) Atyrau
f) West Kazakhstan
g) Zhambyl
h) Zhetysu
i) Karaganda
j) Kostanay
k) Kyzylorda
l) Mangystau
m) Pavlodar
n) North Kazakhstan
o) Turkistan
p) Ulytau
q) East Kazakhstan
r) Astana (city)
s) Almaty (city)
t) Shymkent (city)

4. How long has your enterprise been operating?

a) Less than 1 year
b) 1–3 years
c) 3–5 years
d) 5–10 years
e) More than 10 years

5. Does your enterprise participate in international trade?

a) Yes, we export goods/services
b) Yes, we import goods/services
c) Yes, we both export and import
d) No

6. Please assess the likelihood of the following global economic risks occurring in Kazakhstan over the next 10 years: (Scale from 1 to 5, where 1 = Very unlikely and 5 = Very likely)

Scale	Economic downturn	Critical Infrastructure Disruptions	Disruptions in a systemically important supply chain	Debts	Inflation	Crime and illegal economic activity	Asset Price Crash	Labor shortage	Concentration of strategic resources and technologies
Very unlikely (1)									
Unlikely (2)									
Somewhat likely (3)									
Probably (4)									
Very likely (5)									

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7. Please assess the likelihood of the following global ecological risks occurring in Kazakhstan over the next 10 years: (Scale from 1 to 5, where 1 = Very unlikely and 5 = Very likely)

Scale	Natural resource scarcity	Loss of biodiversity and ecosystem collapse	Critical changes in Earth systems	Extreme weather events	Environmental pollution	Natural disasters not related to weather events
Very unlikely (1)						
Unlikely (2)						
Somewhat likely (3)						
Probably (4)						
Very likely (5)						

8. Please assess the likelihood of the following global geopolitical risks occurring in Kazakhstan over the next 10 years: (Scale from 1 to 5, where 1 = Very unlikely and 5 = Very likely)

Scale	Geo-economic confrontation	Domestic violence	Armed conflict involving a state	Biological, chemical, or nuclear weapons and threats
Very unlikely (1)				
Unlikely (2)				
Somewhat likely (3)				
Probably (4)				
Very likely (5)				

9. Please assess the likelihood of the following global social risks occurring in Kazakhstan over the next 10 years: (Scale from 1 to 5, where 1 = Very unlikely and 5 = Very likely)

Scale	Inequality	Deterioration of health and well-being	Polarization of society	Lack of economic opportunities or unemployment	Forced migration or population displacement	Inadequacy of public infrastructure and social guarantees	Infectious diseases
Very unlikely (1)							
Unlikely (2)							
Somewhat likely (3)							
Probably (4)							
Very likely (5)							

10. Please assess the likelihood of the following global technological risks occurring in Kazakhstan over the next 10 years: (Scale from 1 to 5, where 1 = Very unlikely and 5 = Very likely)

Scale	Disinformation and dissemination of false information	Cyber espionage and cyber warfare	Malicious influence on the Internet	Adverse effects of artificial intelligence technologies	Censorship and surveillance	Adverse effects of advanced technologies
Very unlikely (1)						
Unlikely (2)						
Somewhat likely (3)						
Probably (4)						
Very likely (5)						

11. Please rate the potential impact of the following global economic risks on SMEs in Kazakhstan over the next 10 years: (Scale from 1 to 5: 1 – minimal, 5 – catastrophic)

Scale	Economic downturn	Critical Infrastructure Disruptions	Disruptions in a systemically important supply chain	Debts	Inflation	Crime and illegal economic activity	Asset Price Crash	Labor shortage	Concentration of strategic resources and technologies
Very unlikely (1)									
Unlikely (2)									
Somewhat likely (3)									
Probably (4)									
Very likely (5)									

12. Please rate the potential impact of the following global ecological risks on SMEs in Kazakhstan over the next 10 years: (Scale from 1 to 5: 1 – minimal, 5 – catastrophic)

Scale	Natural resource scarcity	Loss of biodiversity and ecosystem collapse	Critical changes in Earth systems	Extreme weather events	Environmental pollution	Natural disasters not related to weather events
Very unlikely (1)						
Unlikely (2)						
Somewhat likely (3)						
Probably (4)						
Very likely (5)						

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13. Please rate the potential impact of the following global geopolitical risks on SMEs in Kazakhstan over the next 10 years: (Scale from 1 to 5: 1 – minimal, 5 – catastrophic)

Scale	Geo-economic confrontation	Domestic violence	Armed conflict involving a state	Biological, chemical, or nuclear weapons and threats
Very unlikely (1)				
Unlikely (2)				
Somewhat likely (3)				
Probably (4)				
Very likely (5)				

14. Please rate the potential impact of the following global social risks on SMEs in Kazakhstan over the next 10 years: (Scale from 1 to 5: 1 – minimal, 5 – catastrophic)

Scale	Inequality	Deterioration of health and well-being	Polarization of society	Lack of economic opportunities or unemployment	Forced migration or population displacement	Inadequacy of public infrastructure and social guarantees	Infectious diseases
Very unlikely (1)							
Unlikely (2)							
Somewhat likely (3)							
Probably (4)							
Very likely (5)							

15. Please rate the potential impact of the following global technological risks on SMEs in Kazakhstan over the next 10 years: (Scale from 1 to 5: 1 – minimal, 5 – catastrophic)

Scale	Disinformation and dissemination of false information	Cyber espionage and cyber warfare	Malicious influence on the Internet	Adverse effects of artificial intelligence technologies	Censorship and surveillance	Adverse effects of advanced technologies
Very unlikely (1)						
Unlikely (2)						
Somewhat likely (3)						
Probably (4)						
Very likely (5)						

16. How would you assess the financial resilience of your business in the context of global risks?

a) Very low
b) Low
c) Moderate
d) High
a) Very high

17. How prepared is your company for changes in the global economic environment?

a) Not prepared at all
b) Poorly prepared
c) Moderately prepared
d) Well prepared
e) Fully prepared

18. What risk mitigation measures has your enterprise already implemented? (You may select more than one option)

a) Diversification of sales markets
b) Use of reserve funds
c) Process automation
d) Risk management programs
e) No measures taken

19. How would you assess the current level of government support for SMEs in Kazakhstan?

a) Completely insufficient
b) Rather insufficient
c) Partially sufficient
d) Rather sufficient
e) Fully sufficient

20. Which government support measures would help improve the resilience of your business? (You may select more than one option)

a) Reduction of tax burden
b) Expansion of credit programs
c) Support for digitalization
d) Simplification of administrative procedures
e) Other (please specify)

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