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Economic sciences

FROM QUALIFICATIONS TO ADAPTIVE COMPETENCES. THE EVOLUTION OF THE CONCEPT OF COMPETENCE IN MANAGEMENT STUDIES

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Abstract: *This paper presents a concise yet in-depth analysis of the evolution of the concept of competence in management studies, illustrating the shift from the traditional understanding of qualifications as formally certified knowledge and credentials to the contemporary view of competence as a dynamic ability to perform effectively in a changing organisational environment. The starting point for the discussion is the distinction between qualifications, which primarily address the question of an individual's formal preparation for a specific professional role, and competencies, which only become apparent in practice through the way knowledge, skills, attitudes, motivation and responsibility are utilised in specific professional situations.*

The article draws on classical and contemporary concepts of competence, including the approaches of D.C. McClelland, J.C. Flanagan, R.E. Boyatzis, L.M. and S.M. Spencer, T. Teodorescu, C. Rowe, G. Filipowicz, and F. Delamare Le Deist

and J. Winterton. Particular attention is paid to models explaining the multi-layered structure of competence, such as the iceberg model, the competence triangle, and the distinction between 'competence' and 'competency'. The analysis shows that an employee's effectiveness does not stem solely from possessing declarative knowledge or certificates, but from the ability to apply them in conditions of uncertainty, time pressure, cross-departmental collaboration and technological change.

A key aspect of the study is the identification of the growing importance of adaptive skills, understood as the ability to learn, respond flexibly to change, work with technology, demonstrate mental resilience, communicate effectively, make responsible decisions and utilise feedback. In this context, the importance of digitalisation, artificial intelligence, resilience, intellectual capital and organisational communication is discussed. The article emphasises that the development of artificial intelligence does not eliminate the need for human competencies; on the contrary, it increases the importance of critical thinking, data interpretation, ethical responsibility and the combination of human judgement with algorithmic analysis.

The paper also proposes a synthetic approach to competence as a configuration of knowledge, skills, attitudes, motivation, values, responsibility and learning ability, which enables an individual to achieve expected results and adapt to a changing organisational context. The conclusions indicate that modern human resource management systems should go beyond the assessment of documents, diplomas and certificates, taking into account the observation of behaviour, the analysis of work outcomes, the diagnosis of development potential and the employee's ability to learn on the job. Adaptive competencies are thus presented as one of the key conditions for individual effectiveness, corporate innovation and the resilience of the organisation of the future.

Keywords: *competence management, competences, qualifications, adaptive competences, resilience, artificial intelligence, human resource management.*

Introduction. Competencies are a key category in modern management science, as they enable us to describe not only an employee's formal potential, but above all their ability to achieve results within a specific organisational environment. From a managerial perspective, competencies are a bridging category that links human capital theory, human resource management, managerial economics, organisational psychology and the practice of job design [4; 6, pp. 27–46; 7].

In the classical organisational model, qualifications served as a criterion for admission to perform tasks. A diploma, certificate, vocational examination or internship confirmed that the individual met the formal requirements. However, modern organisations are increasingly asking not only what an employee formally possesses, but also how they perform, whether they can apply knowledge in ambiguous situations, how they collaborate with others, and whether they are capable of learning in the face of technological change [25; 29].

This shift is particularly evident in the context of automation and digitalisation. Some technical tasks may be supported by algorithms, expert systems or artificial intelligence solutions, whilst the importance of skills that are harder to replace is growing: critical thinking, data interpretation, responsibility, communication, mental resilience, learning ability and an ethical understanding of the consequences of decisions [13; 18; 28].

The aim of this text is therefore not only to revisit classical definitions, but also to demonstrate their relevance today. McClelland's critique of intelligence tests, the Spencers' iceberg model, the distinction between competence and competency in Rowe and Teodorescu, and Winterton's holistic approach remain useful if interpreted as tools for describing the ability to operate in a changing environment [17, pp. 1–14; 21; 20, pp. 12–17; 22, pp. 27–29; 7, pp. 27–46].

The research objective of this study is to provide a synthetic reconstruction of the evolution of the concept of competence: from a formal, qualification-based approach to an adaptive, behavioural and contextual one.

The research problem can be formulated as follows: How should the classic distinction between qualifications and competences be interpreted in the context of

digital transformation, hybrid work and the growing role of artificial intelligence? The answer requires a combination of definitional, behavioural and applied perspectives. This paper is of a theoretical and review nature, and the method employed is a critical analysis of the literature and a reconstruction of selected competence models [7, pp. 27–46; 10].

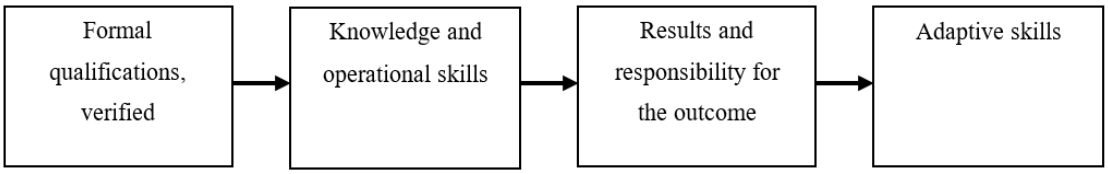

Figure 1. The direction of evolution: from formal qualifications to adaptive competences

Source: own compilation based on: McClelland (1973, pp. 1–14), Kęsy (2008, p. 15), World Economic Forum (2023).

The origins and ambiguity of the concept of competence

Etymologically, the term ‘competence’ derives from the Latin ‘competentia’, meaning suitability, authority, or the ability to speak and act within a specific scope. In the legal and administrative tradition, this concept was primarily associated with the scope of authority. It was only in the social sciences and management that it was transformed into a category describing an individual’s characteristics and their effectiveness in action [26; 10].

J. C. Flanagan’s critical incident technique is regarded as an important stage in the evolution of this concept. Its significance lay in drawing attention to real-life situations and specific behaviours leading to success or failure. Competence began to be understood as a phenomenon observable through the consequences of action, rather than merely as a statement on a qualification form [11, pp. 327–358].

Another breakthrough is linked to an article by D. C. McClelland, who advocated the study of competence rather than intelligence understood in abstract terms. In his view, professional success is not determined solely by test results, formal education or self-reported traits, but by consistent patterns of behaviour,

motivations and the ability to achieve results in real-world work settings [17, pp. 1–14].

However, the presence of several interpretative traditions remains a source of ambiguity. The American approach emphasises the characteristics of the individual and their behaviour, the British approach focuses on standards of work performance, whilst the continental approach seeks to combine knowledge, experience, autonomy, responsibility and professional context. These differences are not merely academic, as they influence the way job profiles, competency assessments and development programmes are constructed [7, pp. 27–46].

In Polish literature, the problem is complicated by the translation of the terms ‘competence’ and ‘competency’. The first term often refers to the ability to perform a specific task in accordance with a standard, whilst the second refers to an individual’s traits, behaviours and dispositions. A mechanical translation of both terms as ‘kompetencje’ leads to the loss of an important distinction between job requirements and the individual’s approach to achieving results [27, pp. 29; 20, pp. 12–17; 22, pp. 27–29].

The practical difference between the concepts of qualifications and competences

Qualifications can be defined as a formally recognised body of knowledge, education or authorisation. They are usually documented by diplomas, certificates, or other forms of institutional recognition. In this sense, qualifications answer the question of whether a person meets the formal criteria for entry into a profession or organisational role [25; 29].

Competences are broader in nature. They denote the ability to effectively apply knowledge, skills and attitudes in a specific context. They are therefore not merely a set of resources possessed by an individual, but a way of putting them into practice. A competent employee not only ‘knows’ (British school), but is able to act, interpret a situation, communicate, learn, correct mistakes and take responsibility for the outcome (American school) [4; 7, pp. 27–46; 10].

This distinction has significant implications for human resource management practice. If an organisation equates qualifications with competencies, it may hire someone who is formally qualified but unable to act independently, collaborate or adapt. It may also design training programmes focused on knowledge transfer rather than behavioural change. Therefore, modern HR systems should take into account both entry qualifications and performance competencies [8; 10].

T. Teodorescu and C. Rowe demonstrate that these concepts describe different dimensions of effectiveness. Competence relates to what is to be done and to what standard, whereas competency concerns how a person achieves the expected standard. For this reason, the assessment of competence should encompass tasks, outcomes, behaviours and the individual's deeper dispositions [20, pp. 12–17; 22, pp. 27–29].

Table 1. Comparison of qualifications and competencies from a management perspective

Evaluation criteria	Qualifications	Competences
Basis for the diagnosis	Diploma, certificate, qualification, work experience, formal training programme.	Observable behaviour, work outcomes, and how knowledge and skills are applied.
Character	Relatively static and institutionally established.	Dynamic, context-sensitive, and evolving as it is used.
Diagnostic question	Does the person meet the formal requirements?	Does the person perform effectively in a given professional situation?
Significance for the organisation	Entry requirements for the profession.	The foundation of efficiency, innovation, learning and competitive advantage.

Source: own compilation based on: Rowe (1995, pp. 12–17), Teodorescu (2006, pp. 27–29), Delamare Le Deist i Winterton (2005, pp. 27–46).

Structural models of competence

The best-known models of competence organise their components and demonstrate why knowledge alone is not sufficient to explain performance. The

competence triangle model highlights the coexistence of knowledge, skills and attitudes. Knowledge enables one to understand a task, skills enable its execution, and attitudes and motivations determine whether an individual is prepared to act responsibly and consistently (Weinert, 2001; Filipowicz, 2019).

The Spencer glacier model further develops this perspective by distinguishing between visible and hidden elements. Knowledge and technical skills are relatively easy to identify and develop. Personality traits, motives, values, self-image and social role are less visible, more difficult to change quickly, but often determine above-average effectiveness (Spencer and Spencer, 1993).

In practice, this means that different diagnostic methods must be combined. A knowledge test may confirm substantive preparedness, but it will not reveal resilience under pressure, willingness to cooperate or how one reacts to conflict. Assessment centres, behavioural interviews, critical incident analysis, 360-degree feedback and observation of project work allow us to access deeper layers of competence (Flanagan, 1954, pp. 327–358; Dubois and Rothwell, 2008; Filipowicz, 2019).

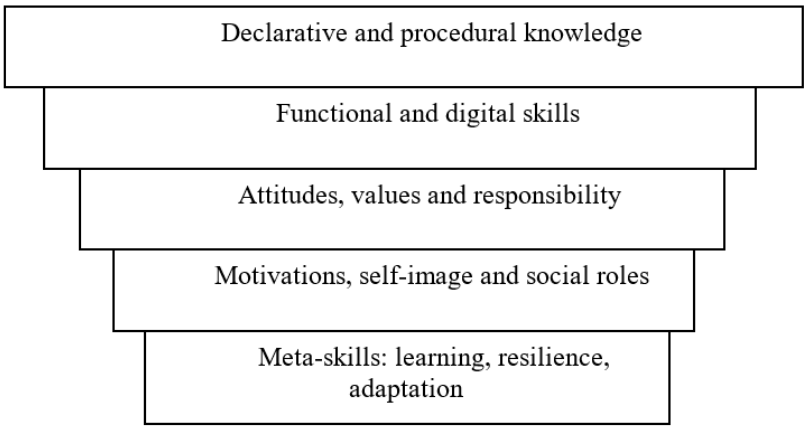

Figure 2. A layered model of competence: from knowledge to meta-competence

Source: own compilation based on D.C. McClellanda (1973, pp. 1–14), L.M. i S.M. Spencerów (1993) and J. Wintertona (Delamare Le Deist i Winterton, 2005, pp. 27–46).

D. D. Dubois and W. J. Rothwell define competencies as personal traits consistently utilised to achieve expected outcomes. This definition combines personal and organisational components. Competence does not exist solely ‘within the

individual', but manifests itself in relation to a task, a standard, a context and the expected outcome (Dubois and Rothwell, 2008).

Adaptive skills in the digital age

The modern labour market is highlighting the importance of adaptive skills. It is no longer simply a matter of matching an individual to a clearly defined role, but rather about the ability to learn, reconfigure resources, interact with technology and respond responsibly to change. Reports on the future of work indicate that the rapid obsolescence of knowledge requires employees to develop meta-competences: learning, critical thinking, problem-solving and cognitive flexibility (Harzman, 2022; World Economic Forum, 2023).

Researcher M. Kęsy's perspective allows us to link the debate on competences with the issue of aligning education with employers' needs. Young people's professional competences cannot be understood solely as the result of the curriculum. They emerge at the intersection of schools, universities, businesses, labour market institutions and the actual tasks performed within organisations. The gap between formal qualifications and practical competences is particularly evident among graduates entering the labour market (Kęsy, 2008, p. 15).

The concept of resilience, developed in Polish literature by A. Borucka and others, can be creatively applied to the field of management. It refers to the ability to adapt positively despite difficulties, stress or risk. In an organisation, resilience manifests itself in maintaining operational efficiency during a crisis, making constructive use of social support, the ability to learn from failures, and maintaining responsibility despite pressure (Borucka and Ostaszewski, 2012, pp. 11–36; Borucka and Pisarska, 2012).

E. Chomać-Pierzecka, in her analysis of a company's capital and innovation, reinforces the argument that competencies are a component of intellectual capital. An organisation competes not only with its material resources, but also with people's ability to transform knowledge into new solutions. Adaptive competences are therefore not only a characteristic of an employee, but also a prerequisite for a company's innovation (Chomać-Pierzecka, 2018, pp. 195–208).

Co-authored research by M. Ćwiąkała on communication, managerial behaviour and artificial intelligence, in turn, indicates that digital tools do not eliminate the need for human competencies. On the contrary, they increase the importance of skills in interpretation, communication, trust-building, accountability for data-driven decisions, and combining human judgement with algorithmic analysis (Baran, Górka, Ćwiąkała et al., 2025; Górka, Baran, Wojak, Ćwiąkała et al., 2025).

Assessment and skills development: from words to action

Competence development should not be equated solely with participation in training. Training can increase knowledge, but it does not always change behaviour. Therefore, an effective development process requires a cycle comprising: gap diagnosis, learning design, applying knowledge in practice, feedback, and readjustment of the competence model (Dubois and Rothwell, 2008; Filipowicz, 2019; Universal Competency Model, 2011).

The critical incident method plays a significant role here. It allows for the analysis of situations in which an employee's actions led to particularly positive or negative outcomes. On this basis, it is possible to identify differentiating behaviours, i.e. those that distinguish average employees from above-average ones (Flanagan, 1954, pp. 327–358).

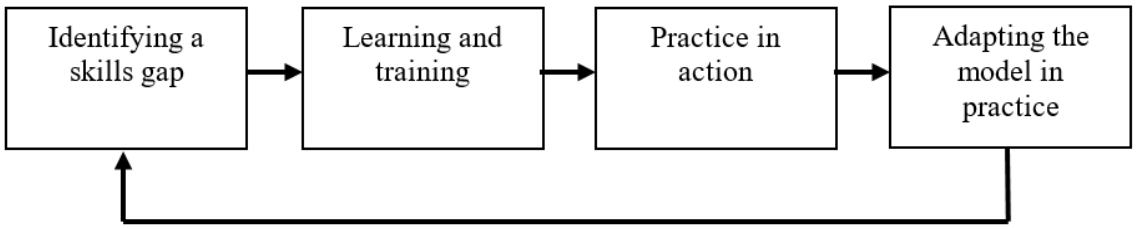

Figure 3. A cyclical model of competence development

Source: own compilation based on: Dubois i Rothwell (2008), Filipowicz (2019) and Uniwersalny Model Kompetencyjny (2011).

In organisational practice, diagnostic tools should be varied. A self-assessment questionnaire provides insight into an employee's self-perception, but needs to be supplemented by feedback from their line manager, colleagues and internal clients. Simulation exercises allow one to observe how an individual performs under

pressure, whilst a development interview enables the assessment to be linked to a learning plan (Dubois and Rothwell, 2008; Filipowicz, 2019).

The integration of artificial intelligence into HR processes can streamline data analysis, but does not relieve the organisation of its responsibility for interpreting the results. An algorithm can identify patterns, but a manager must assess their context, the risk of bias and the implications for the employee's development. Digital competencies are therefore becoming part of managerial competencies (Tippins and Sohi, 2003, pp. 745–761; Mithas et al., 2024; Górka, Baran, Wojak, Ćwiąkała et al., 2025).

Table 2. Tools for assessing and developing competences

Stage	Tools	The result for the organisation
Diagnosis	Behavioural interview, 360-degree assessment, critical incident analysis.	Identifying actual skills gaps and differentiating skills.
Uczenie się	Training, mentoring, coaching, project work.	Transforming knowledge into skills and behaviour.
Zastosowanie	Implementation tasks, cross-departmental projects, data analysis.	Competency testing in organisational practice.
Feedback	Performance review, measuring results, analysing indicators.	Review of behaviour and development plan.
Adaptacja	Updating competency profiles and development pathways.	Adapting the HR system to technological and market changes.

Source: own compilation based on: Flanagan (1954, pp. 327–358), Dubois i Rothwell (2008), Filipowicz (2019).

A proposal for a synthetic definition and research model. Based on the analysis conducted, the following definition can be proposed: competencies are a dynamic configuration of knowledge, skills, attitudes, motivation, values, responsibility and learning ability, which enables an individual to perform effectively in a specific professional role, achieve expected results and adapt to changes in the organisational context (Boyatzis, 1982; Delamare Le Deist and Winterton, 2005, pp. 27–46; Filipowicz, 2019).

This definition integrates behavioural and functional approaches. On the one hand, it emphasises how a person acts; on the other, it highlights the link between

competencies and the requirements of the role and the standard of outcomes. It also allows for the inclusion of meta-competencies in the analysis, i.e. the abilities that underpin the development of other competencies: learning, reflectiveness, flexibility and resilience (Delamare Le Deist and Winterton, 2005, pp. 27–46; Borucka and Pisarska, 2012; World Economic Forum, 2023).

In further empirical research, a model can be adopted in which formal qualifications are the independent variable, behavioural and adaptive competences act as mediating variables, and professional effectiveness, innovation and the ability to work in a changing environment are the dependent variables. This avoids the oversimplification that the level of education alone automatically translates into performance (Kęsy, 2008; Dubois and Rothwell, 2008).

A particularly promising area of research is the study of the relationship between digital and social competences. In many professions, effectiveness no longer stems from possessing a single set of skills, but from the combination of these skills. Employees must understand technology, but also communicate its outcomes, explain its limitations, collaborate with others and act ethically (Tippins and Sohi, 2003, pp. 745–761; Piwowarczyk, 2020; Harzman, 2022).

Table 3. Proposed research model of adaptive competences

Model component	Example indicators	Research significance
Formal qualifications	Level of education, qualifications, experience, licences.	They describe the requirements for entering the profession.
Behavioural competences	Communication, cooperation, responsibility, initiative.	They explain how results are achieved.
Adaptive skills	Learning, flexibility, resilience, working with AI.	They describe the ability to operate in a changing environment.
Professional efficiency	Quality of work, timeliness, innovation, stakeholder feedback.	It is the result of applying one's skills.

Source: own compilation based on: Boyatzis (1982), Delamare Le Deist i Winterton (2005, pp. 27–46), World Economic Forum (2023).

Conclusions. The literature review conducted by the researchers confirms that qualifications and competencies are not synonymous. Qualifications describe an individual's formal status, whereas competencies are demonstrated through action. For organisations, this means the need to build HR systems that combine formal requirements with the observation of behaviour and the assessment of results (Rowe, 1995, pp. 12–17; Teodorescu, 2006, pp. 27–29; Filipowicz, 2019).

The authors state that classical competency models remain relevant, but require refinement in the context of digitalisation. The competency triangle model, the iceberg model, and the distinction between competence and competency can serve as a foundation for designing modern competency profiles, provided they are supplemented with adaptive and ethical meta-competencies (Spencer and Spencer, 1993; Delamare Le Deist and Winterton, 2005, pp. 27–46; Harzman, 2022).

Organisations of the future should treat competencies as open configurations, geared towards a holistic approach, rather than as isolated traits within a closed system. An employee's effectiveness is determined by a combination of knowledge, skills, attitudes, motivation, resilience, responsibility and learning ability. In this sense, competencies are simultaneously an individual, relational and strategic resource (Boyatzis, 1982; Chomać-Pierzecka, 2018, pp. 195–208; Filipowicz, 2019).

Researchers point out that developing competencies requires long-term approaches. Training is just one of these elements. Experience, feedback, coaching, project work, reflection and learning from real organisational problems are of key importance. Competence development understood in this way becomes a prerequisite for an organisation's innovation, stability and resilience (Dubois and Rothwell, 2008; Filipowicz, 2019).

For managers, this means the need to create an environment conducive to learning. An employee will not develop resilience, independence and responsibility if the organisational culture punishes every mistake, blocks experimentation or restricts feedback. Adaptive competences therefore require not only individual effort but also the right organisational conditions: trust, clear goals, constructive feedback and space for reflection (Borucka and Pisarska, 2012; Filipowicz, 2019).

In employee development, it is particularly valuable to combine a competency-based approach with mentoring and on-the-job learning. Adaptive competences are shaped by experience, especially in situations where an individual must change their current way of working. Therefore, development tasks should gradually increase the level of autonomy, responsibility and complexity, rather than being limited to one-off training sessions (Dubois and Rothwell, 2008; Universal Competency Model, 2011).

In recruitment, this means moving away from simply checking application documents towards assessing behaviour and learning potential. A degree or certificate remains important, but should be treated as a prerequisite rather than sufficient proof of competence. The organisation should examine how a candidate solves problems, communicates limitations, uses data, responds to uncertainty, and whether they are able to learn from feedback (Rowe, 1995, pp. 12–17; Filipowicz, 2019).

The shift from qualifications to adaptive competences should be reflected in the way education is designed and in recruitment practices. Educational programmes that focus exclusively on imparting declarative knowledge may increase formal qualifications, but do not always develop the ability to act independently. Consequently, project-based methods, case studies, problem-based tasks, decision-making simulations and teamwork are becoming increasingly important (Kęsy, 2008; Council Recommendation, 2018; Vitello and Greatorex, 2022).

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Economic sciences

ENTREPRENEURIAL RESILIENCE MODELS UNDER PERMANENT CRISIS CONDITIONS: EVIDENCE FROM UKRAINE, ISRAEL AND GEORGIA

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Abstract. *Business environments across a growing number of countries are no longer disrupted by crises — they are defined by them. Against this backdrop, the question of what makes some organisations genuinely resilient while others merely survive has moved from the periphery of management theory to its centre. This article investigates entrepreneurial resilience as a dynamic organisational capability shaped under conditions of permanent geopolitical and economic stress. Drawing on a comparative analysis of Ukraine, Israel and Georgia — three small open economies that have faced prolonged, structurally distinct crises — the study identifies three*

divergent resilience models and examines the adaptation strategies underpinning each. The theoretical framework integrates dynamic capabilities theory (Teece, Pisano), antifragility theory (Taleb), a typology of crisis impact regimes on business models, and the principle of Resilience by Design. Ukraine emerges as a case of mobilisation digitalisation, where the Diia state ecosystem has served as a stabilising scaffold for small and medium-sized enterprises (SMEs) operating under wartime conditions. Israel exemplifies transborder antifragility — a model in which security crises accelerate innovation, with the cybersecurity sector alone attracting 36% of all venture funding in 2024. Georgia illustrates the limits of liberal economic reform: an opportunistic transit hub whose growth proved structurally shallow and institutionally fragile. Four crisis impact regimes are systematised — antifragile, robust, adaptive and suspended — each calling for a distinct management response. The findings demonstrate that digital public infrastructure functions as a public good critical to SME survival during systemic shocks, and that fiscal liberalisation loses its stimulating effect when judicial independence erodes. Five strategic priorities are formulated for crisis-resilient management: prioritising institutional trust over tax incentives; embedding Resilience by Design at the architectural level; investing in digital public platforms; treating human capital retention as a form of strategic defence; and developing hybrid public-private startup financing models.

Keywords: *entrepreneurial resilience; business model transformation; antifragility; digital transformation; organisational resilience; systemic crisis adaptation; SMEs; wartime economy; Diia.City; comparative analysis.*

Problem statement. The architecture of global risk has shifted in ways that render much of the conventional crisis management literature inadequate. Where crises were once understood as discrete, bounded events — shocks from which a system recovers and returns to equilibrium — a growing number of economies now function in a state of open-ended, multi-layered instability. Geopolitical conflict, digital disruption, demographic dislocation and institutional decay no longer arrive in sequence; they compound one another. For enterprises operating in such

environments, reactive crisis management has ceased to be a viable strategy. Resilience can no longer be an emergency protocol activated after a shock — it must be embedded in the architecture of the organisation itself.

The urgency of this question is especially acute for Ukraine, whose business environment has been operating under conditions of full-scale armed aggression since 2022 — a degree of sustained disruption that has no modern peacetime equivalent. Yet the experiences of Israel and Georgia, both of which have long navigated elevated security and institutional uncertainty, offer comparative perspectives that are rarely brought into dialogue with the Ukrainian case. Understanding what each of these countries has done well, where each has fallen short, and what the patterns across all three reveal about the dynamics of entrepreneurial adaptation under duress — this is the animating question of the present study.

Analysis of recent research and publications. The theoretical roots of this study reach across several scholarly traditions. The concept of dynamic capabilities, developed by Teece D. and Pisano G. [1], defines organisational resilience not as a fixed characteristic but as the capacity to continuously reconfigure resources and competencies in response to shifting environmental conditions. Taleb N.N. [2] extended this logic with the notion of antifragility — the counterintuitive property of systems that do not merely withstand volatility but actually strengthen as a result of it. The classification of how different types of crises affect business models, and the mechanisms through which firms adapt, draws on the work of Rialp-Criado A. [3] and Zott C. [4], who demonstrated that business model innovation serves as a critical mediator between adaptive potential and financial performance. The three-phase model of organisational resilience — preventive awareness, operational adaptation and strategic repositioning — was articulated in the contributions of Brito E. [1] and Lengnick-Hall C. [5].

Within the Ukrainian academic community, the question of how SMEs adapt under wartime conditions has been addressed primarily through a practical lens. Research by OECD [6] and EU Scientists [7] has documented the scale of the disruption; however, the comparative dimension — how Ukraine's experience relates

to that of other economies that have long operated under sustained security or institutional stress — remains underdeveloped. It is precisely this gap that the present article seeks to address.

Aim and objectives of the article. The aim of this article is to conduct a comparative analysis of entrepreneurial resilience models and business model transformation strategies under conditions of permanent crisis, using Ukraine, Israel and Georgia as case studies, and to formulate strategic recommendations for businesses and government institutions on building organisational resilience as a systemic, designable property — rather than an improvised response.

Presentation of the main research material. Theoretical and methodological foundations. Contemporary strategic management theory has moved decisively away from viewing organisational resilience as a static buffer against external shocks. The prevailing understanding is that resilience is a dynamic capability — the ability to absorb disruption, adapt to altered conditions and, at the highest level, transform adversity into a source of competitive advantage [1; 2]. What the empirical record of firms during periods of sustained macroeconomic and geopolitical turbulence consistently reveals is that it is business model innovation, rather than product or process innovation alone, that serves as the critical mediator between adaptive potential and financial performance [3; 4]. When the rules of the market itself change, reconfiguring individual offerings is often insufficient — what is required is a fundamental rethinking of how value is created, delivered and captured [3; 5].

In practice, the impetus for business model transformation during a crisis typically corresponds to one of four distinct impact regimes, each of which calls for a different strategic posture and management toolkit [7; 8]. These regimes are systematised in Table 1.

Table 1. Crisis impact regimes on business models and corresponding adaptation strategies

Impact regime	Nature of the disruptive factor	Key adaptation mechanism	Strategic focus
Antifragile	Crisis-generated demand surge for specific solutions creates positive pressure on the business [7]	Scaling of digital platforms, activation of surplus logistics capacity, accelerated globalisation of distribution channels	Maximising market share; accelerating core business processes
Robust	Overall market volume fluctuates, but the operational core remains stable [7]	Cost optimisation and supply chain flexibility, without altering the fundamental value architecture	Workforce protection, liquidity management, customer base retention
Adaptive	Deep deformation of both consumer demand and the operating environment [7]	Radical reorientation of the value proposition; shift to remote delivery or sharing-based monetisation	Rapid hypothesis testing; cross-sector partnerships [10]
Suspended	Temporary inability to operate due to physical destruction or legal constraints [7]	Asset conservation and capital preservation, with retention of the core team	Securing emergency financing (grants, subsidies); preparation for restart

Source: systematised by the authors based on [3; 7; 8].

What Table 1 makes clear is that the regime a company finds itself in is not determined by the crisis alone. Internal factors — the degree of digital readiness, the flexibility of operational processes, the quality of prior strategic planning — shape which of these trajectories becomes available. The antifragile path is not open to every organisation; it requires pre-built capabilities that most firms only recognise as strategic assets in retrospect. The suspended regime, by contrast, is frequently not a choice but a consequence of the absence of financial reserves that would have made other options possible.

Deploying business model innovation under conditions of prolonged stress is consistently impeded by a cluster of systemic barriers: organisational inertia, the cognitive narrowing that accompanies sustained pressure, management's fear of cannibalising existing revenue streams and the straightforward scarcity of resources [8; 11]. What the cross-country evidence repeatedly shows is that successful adaptation is not simply a function of firm-level strategy — it depends critically on the quality of the enabling environment: the availability of digital public infrastructure, the responsiveness of regulatory policy and the coherence of the state's crisis management architecture [1; 2].

Ukraine: mobilisation digitalisation as a stabilising scaffold. Russia's full-scale invasion precipitated a degree of operational disruption for Ukrainian business that is without precedent in recent economic history. In the initial phase of the assault, approximately 64% of SMEs were forced to suspend or dramatically curtail their activities [6]. Even as the front line stabilised, average SME revenue had fallen by 43% and staffing levels by roughly 22% [7]. By 2024, Ukraine's Human Capital Index had declined 19% relative to the European average, with unemployment running at 17–20% [8].

What distinguishes the Ukrainian response is the degree to which advanced digital infrastructure — built during the 2015–2020 reform period with support from the World Bank, IMF and EBRD — enabled both macroeconomic governance and business continuity under wartime conditions [9]. The Diia ecosystem, which by the end of 2025 had reached more than 23 million users, had evolved into a comprehensive platform mediating interactions between citizens, businesses and the state [9]. The Diia.Sign digital signature technology made it possible to conduct business legally from anywhere in the world; the Diia.City special legal framework had attracted more than 1,560 corporate residents by 2025 [9].

The private sector proved remarkably agile. By 2026, Ukraine counted 11 million active online shoppers, with 60% of transactions completed via mobile devices [19]. Nova Poshta repositioned itself as a leading logistics operator across Central Europe. ERP system integration enabled SMEs to cut order processing times

by 25%, and the introduction of blockchain-based customs tools reduced cross-border disputes by 44% [11]. A substantial unmanned aerial systems (UAS) industry also emerged — one that currently depends heavily on short-term donor funding and will require a transition to sustainable public-private partnership financing to realise its long-term potential [10].

Key indicators of SME development and digitalisation in Ukraine during 2024–2026 are presented in Table 2.

Table 2. Key SME development and digitalisation indicators in Ukraine (2024–2026)

Indicator	Value	Source
Average SME revenue decline due to the war	43%	[7]
Average SME workforce reduction	22%	[7]
Human Capital Index decline vs. EU average	19%	[8]
Unemployment rate during wartime	17–20%	[8]
Diia ecosystem registered users	> 23 million	[9]
Share of large companies / SMEs with a web presence	70% / 30%	[6]
Rozetka's estimated share of the online retail market	45–50%	[19]

Source: systematised by the authors based on [6; 7; 8; 9; 19].

The figures in Table 2 capture what might be called the Ukrainian paradox: a business environment suffering historically severe shocks — a 43% revenue decline, a 22% workforce contraction — simultaneously undergoing rapid digitalisation. This is not coincidental. It reflects the hypothesis, supported by the Ukrainian experience, that a sufficiently robust digital public infrastructure can function as a genuine anti-crisis stabiliser, preserving economic continuity even as physical and logistical channels of commerce are destroyed. The sharp gap between large firms (70% with a web presence) and SMEs (30%), however, signals a structural inequality in digital access that constitutes one of the most important policy challenges of the recovery period.

Israel: transborder antifragility and the cybersecurity premium. The escalation of conflict following October 2023 struck Israel's technology sector — which accounts for more than 15% of GDP — with immediate operational force. In the first weeks of intensive fighting, between 15% and 25% of skilled IT professionals were called up as military reservists [11]. Around 70% of startups reported significant disruption to their operations; 40% saw financing rounds suspended or withdrawn [11].

Yet the Israeli startup ecosystem's response illustrated, in real time, what antifragility looks like in practice. Major technology companies — Gong among them — had already built distributed operational architectures that allowed critical R&D functions to be activated from offices in Ireland and New York [12]. Rather than cutting staff, employers pivoted to an entirely different set of benefits: subsidised housing in secure locations, round-the-clock access to medical and psychological support [12]. UCT Israel restructured its air freight operations to deliver critical components in two days rather than a week [12].

The financial data tell a striking story. Venture investment in Israel reached $15.6 billion in 2025, up 24% year-on-year and 68% above the 2023 level [11]. The primary beneficiary was cybersecurity: a sector comprising just 7% of ecosystem companies that captured 36% — or $3.8 billion — of total venture funding in 2024 [14]. Israeli companies including Zenity, Noma Security and Prompt Security are now leading the development of AI Security tooling — the emerging field of protection and access governance for generative AI systems [14].

Georgia: liberal model and the limits of institutional reform. The sweeping reforms of 2004–2012 established Georgia's reputation as one of the most open and business-friendly economies in the post-Soviet space [15]. That reputation, however, was never matched by a resolution of the country's underlying structural weaknesses: the current account deficit has persistently stood at around 12% of GDP, and roughly 60% of merchandise exports consist of raw materials [15].

The mass arrival of more than 100,000 Russian relocants in 2022–2023 — approximately 3% of Georgia's population — generated what proved to be an

artificial economic acceleration. GDP climbed from $17.6 billion in 2014 to $30.6 billion in 2023 [17], and growth ran at 7,5% in 2025 [18]. But the boom also exposed the fragility of the model. Inflationary pressure in the property market, the registration of shell companies, and a transit character of capital inflows all pointed to the same problem: growth without depth. By 2024, the migrant outflow was already reversing [16; 18].

The political pivot has proven more consequential still. The adoption of the 'foreign agents' legislation in 2023 and the subsequent suspension of EU accession talks until 2028 triggered a freeze in Western financial and institutional support [18]. Western FDI is contracting; less transparent capital from the east is filling the gap [18]. GITA — the Georgian Innovation and Technology Agency — continues to support a Tbilisi startup scene capitalised at $243 million [20], but without a restored European integration trajectory, these initiatives risk remaining isolated islands of ambition within a commodity-dependent economy.

A comparative view across the three models. The analysis supports the identification of three structurally distinct approaches to business survival and transformation under prolonged adversity, which are systematised in Table 3.

Table 3. Comparative characteristics of entrepreneurial resilience models: Ukraine, Israel and Georgia

Comparison criterion	Ukraine (Mobilisation digitalisation)	Israel (Transborder antifragility)	Georgia (Opportunistic transit hub)
Crisis type	Armed aggression and large-scale infrastructure destruction	Security conflict with partial military mobilisation	Institutional degradation compounded by migration shock
Key stabiliser	State digital platform (Diia)	Decentralised business architecture with cross-border R&D duplication	Liberal regulatory framework and geographic transit position
Dominant adaptation sector	E-commerce, logistics, DefenseTech	Cybersecurity, AI, AI Security tooling	Tourism, financial services, real estate
Primary	External donor funding	Venture capital ($15.6	Relocant private capital

Comparison criterion	Ukraine (Mobilisation digitalisation)	Israel (Transborder antifragility)	Georgia (Opportunistic transit hub)
financing source	and international grants	bn in 2025)	and tourism revenues
Principal risk	Structural dependence on sustained external support	Progressive startup migration to foreign jurisdictions	Permanent loss of EU market access if reform trajectory is not restored

Source: systematised by the authors

What emerges from Table 3 is that no single model is unconditionally superior. Each carries genuine strengths alongside structural vulnerabilities that crisis conditions tend to amplify rather than conceal. Ukraine leverages digital mobilisation to offset physical destruction but remains acutely dependent on the continuity of external financing. Israel converts security pressure into innovation velocity but risks hollowing out its domestic ecosystem as successful companies migrate to more stable jurisdictions. Georgia benefited from a demographic windfall but has failed to convert transient capital into durable institutional or industrial capacity. Across all three cases, the quality of the institutional environment emerges as the decisive variable — more influential than the type of crisis, the sectoral composition of the economy or the scale of fiscal incentives on offer.

Conclusions and prospects for further development. The comparative analysis conducted across Ukraine, Israel and Georgia yields findings that are relevant well beyond the three cases examined. Entrepreneurial resilience, the study demonstrates, is not an instinct that firms discover in extremis — it is a systemic property that must be designed in advance, embedded in the architecture of the business model before the next crisis arrives. Companies that had already integrated redundant management circuits, distributed infrastructure and flexible human capital strategies before 2022 or 2023 consistently outperformed those that had not, regardless of the severity of the external shock.

Digital public infrastructure, the Ukrainian case makes clear, is not merely a convenience — it is a public good that can determine whether small businesses

survive a systemic shock at all. The Diia ecosystem demonstrates that investment in interoperable state digital services can radically reduce transaction costs and allow SMEs to maintain legal and commercial continuity even when their physical operating environment has been destroyed. Yet the Diia experience also illustrates a crucial limitation: a digital scaffold alone is not sufficient. Targeted subsidies, concessional credit and human capital support programmes must accompany it, because without them the platform cannot prevent the long-term erosion of the business base it is designed to serve.

Georgia's trajectory offers perhaps the study's sharpest lesson for policymakers: low taxes and simplified registration lose their power to attract and retain genuine economic activity the moment that judicial independence is compromised and property rights become uncertain. Fiscal liberalisation is a necessary but far from sufficient condition for a resilient entrepreneurial environment. The primacy of institutional quality over fiscal generosity is not a normative preference — it is an empirical finding supported by Georgia's own recent experience.

Finally, the study highlights a systemic vulnerability shared, in different forms, by all three economies: excessive reliance on a single funding modality — short-term donor grants in Ukraine and Georgia, late-stage venture capital in Israel — creates a structural fragility in the innovation pipeline. Hybrid financing models that combine public and private capital to support early-stage ventures represent the most promising structural remedy. Two directions for further research stand out as particularly pressing. The first is the development of quantitative methodologies for evaluating the relative effectiveness of specific adaptation strategies. The second is the construction of an organisational resilience index applicable to enterprises operating under wartime or sustained institutional crisis conditions.

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ECONOMIC EFFECT FROM THE IMPLEMENTATION OF NANOECOLOGICAL TECHNOLOGY IN THE CONDITIONS OF PRIMARY PREPARATION OF OIL

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Abstract: *It is noted that nanoecological technology in the practice of primary preparation of oil (PPO) is studied in more detail for the first time. One of the priority issues in this area is the economic assessment of the state of implementation of nanoecological technology. This article is devoted to these issues. The article presents the results of calculating the actual and expected economic effects from the implementation of nanoecological technology using demulsifiers with a polynostructure of the "İKHLAS" type, in the conditions of PPO at six fields of the Republic of Kazakhstan, taking into account the data of 2024. During the literature search on the issues of nanoecological technology in the conditions of primary preparation of oil (PPO), no relevant information was found. The only exceptions were the works published by us [1-9]. Therefore, the development of this area is of particular ecological and technological relevance in general for global oil production. One of the priority issues in this area is the economic assessment of the state of implementation of nanoecological technology in the conditions of PPO. This article is devoted to these issues. The purpose of the work: Calculation of the economic effect from the implementation of nanoecological technology in the conditions of PPO. The calculation of the economic effect includes the following sections: Introduction; 1.Calculation of the actual economic effect during the pilot tests and the annual expected economic effect for the "IKHLAS-1" nanodemulsifier*

at the "Zhetybai" field of MMG JSC; 2. Calculation of the actual annual economic effect from the implementation of "IKHLAS-1" at the "Tenge Oil & Gas" field; 3. Calculation of the actual annual economic effect from the introduction of the nanodemulsifier "IKHLAS-1" at the "Phystech II" JSC field; 4. Calculation of the actual annual economic effect from the introduction of the nanodemulsifier "IKHLAS-1" at the Akkulka field of TetisAralGaz LLC; 5. Calculation of the actual annual economic effect for nanodemulsifiers "IKHLAS-1" and "IKHLAS-2" at the fields and OPPSh (oil preparation and pumping shop) of OGPD (oil and gas production department) "Zhaikmunaigas" of JSC "Embamunaigas"; 6. Calculation of the actual annual economic effect for the nanodemulsifier "IKHLAS-1" at the "Karsak" Central Processing Plant and the "Botakhan" field of the "Dossormunaigas" Oil and Gas Production Department (OGPD) of "Embamunaigas" JSC. As a result of the systematic calculations, it was found that the actual and expected economic effects from the implementation of nanoecological technology using "İKHLAS" nanodemulsifiers, in the conditions of PPO at the studied oil-fields of the Republic of Kazakhstan amount to $ 604,402 and $ 2,272,610, respectively. At the same time, the level of contamination of waste formation water with oil was 2.5-42 times lower in comparison with basic technologies and did not exceed the levels of the current standard (50 mg/dm^3).

Key words: *nanoecological technology, economic efficiency from the implementation of demulsifiers "İKHLAS" with polynostructure, reduction of pollution levels of waste formation water with oil*

Introduction. During the literature search on the issues of nanoecological technology in the conditions of primary preparation of oil (PPO), no relevant information was found. The only exceptions were the works published by us [1-9]. Therefore, the development of this area is of particular ecological and technological relevance in general for global oil production. One of the priority issues in this area is the economic assessment of the state of implementation of nanoecological technology in the conditions of PPO. This article is devoted to these issues. The purpose of the

work: Calculation of the economic effect from the implementation of nanoecological technology in the conditions of PPO. The economic calculation of the implementation of nanoecological technology in the conditions of PPO is presented for six oil fields of the Republic of Kazakhstan (“Zhetybai” field of MMG JSC; “Tenge Oil & Gas”; "Phystech II" JSC; Akkulka field of TetisAralGaz LLC; OPPSh (oil preparation and pumping shop) of OGPD (oil and gas production department) “Zhaikmunaigas” of JSC “Embamunaigas”; Botakhan field of the Dossormunaigas Oil and Gas Production Department of Embamunaigas JSC). Based on 2019 data, the preliminary calculation is presented in [10], and the present calculation is based on 2024 data. The work was carried out, on the basis of an agreement on scientific and technical cooperation between Azerbaijan State Oil and Industry University and “International Oil Services Kazakhstan” LLP.

1. Calculation of the actual economic effect during the pilot tests and the annual expected economic effect for the “IKHLAS-1” nanodemulsifier at the “Zhetybai” field of MMG JSC

Initial data:

During the period from 03.11.14 to 03.12.14, pilot tests of the nanodemulsifier “IKHLAS-1” were carried out at the “Zhetybay” field of JSC “MMG”. The results were quite successful;

Base demulsifier: “Randem-2219”;

The cost of one ton of “Randem-2219” is 1,684,900 tenge;

The cost of one ton of “IKHLAS-1” is 1,394,400 tenge;

The volume of annual oil production: 2,157,300 tons;

The average monthly oil production: 2,157,300:12 = 179,775 tons.

The average specific consumption of the base demulsifier “Randem-2219” is 204 g/t;

Average specific consumption of nanodemulsifier “IKHLAS-1” is 178 g/t;

Recommended average specific consumption of nanodemulsifier “IKHLAS-1” is 160 g/t;

Daily volume of hard to destroy water-oil emulsions (HDWOE), formed at the basic technology is ~100 m^3, and the annual volume is 36,500 m^3;

Costs for processing 1 m^3 HDWOE on a tricanter for the basic technology are 20,916 tenge;

Average specific consumption of nanodemulsifier "IKHLAS-1" for processing HDWOE together with crude oil is 178 g/t, i.e. no additional dosages is required;

Calculation of the actual economic effect with the "IKHLAS-1" pilot tests:

Annual consumption of "Randem-2219": (204 x 2,157,300)/1,000,000 = 440 t;

Average monthly consumption of "Randem-2219": 36.7 t;

Average monthly costs for processing 3000 m^3 of HDWOE on a tricant: 3000 x 20,916 = 62,748,000 tenge

Cost of 36.7 tons of "Randem-2219": 1,684,900 x 36.7 = 61,835,830 tenge

Total monthly costs of "Randem-2219": 61,835,830 + 62,748,000 = 124,583,830 tenge

Actual costs of "IKHLAS-1" for 1 month (03.11.14-03.12.14): 1,394,400 x 32 = 44,620,800 tenge.

Actual economic effect of the pilot testing of "IKHLAS-1":

124,583,830 - 44,620,800 = 79,963,030 tenge ($177,514, dollar to tenge exchange rate on 06.08.24: 1$=450.46 tenge).

Results:

1. The actual economic effect of the pilot testing of "IKHLAS-1" at "Zhetybai" of MMG JSC is 79,963,030 tenge ($177,514).

2. The level of reduction of the concentration of oil and oil products in the composition of formation water from 600-1400 mg/dm^3 to 20-28 mg/dm^3 (42 times reduction on average) meets the requirements of the formation pressure maintenance (oil in the composition of formation water is not more than 50 mg/dm^3).

Calculation of the actual economic effect with the IKHLAS-1 pilot testing:

Annual consumption of "Randem-2219": (204 x 2,157,300)/1,000,000 = 440 t;

Average monthly consumption of "Randem-2219": 36.7 t;

Average monthly costs for processing 3000 m3 of HDWOE on a tricant: 3000 x 20,916 = 62,748,000 tenge;

Cost of 36.7 tons of "Randem-2219": 1,684,900 x 36.7 = 61,835,830 tenge

Total monthly costs of "Randem-2219": 61,835,830 + 62,748,000 = 124,583,830 tenge

Actual costs of "IKHLAS-1" for 1 month (03.11.14-03.12.14): 1,394,400 x 32 = 44,620,800 tenge.

Actual economic effect of the pilot testing of "IKHLAS-1":

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2. Calculation of the actual annual economic effect from the implementation of "IKHLAS-1" at the "Tenge Oil & Gas" field

Initial data:

In the period from 10.05.17 to 05.06.17, pilot tests of the "IKHLAS-1" nanodemulsifier were carried out at the "Tenge Oil & Gas" field. Since the beginning of 2018, the "IKHLAS-1" nanodemulsifier is successfully implemented at the "Tenge Oil & Gas" field.

Basic demulsifier: "Dissolvan V 5748" (Germany);

Cost of one ton of "Dissolvan V 5748": 1,859,200 tenge;

Cost of one ton of "IKHLAS-1"; 1,394,400 tenge;

Volume of annual oil production: 116,340 tons;

Average specific consumption of the basic demulsifier "Dissolvan V 5748" is 186 g/t;

Average specific consumption of the nanodemulsifier “IKHLAS-1” is 170 g/t;

Concentration of oil and oil products in the composition of formation waters in the case of the basic demulsifier “Dissolvan V 5748” is 370-1290 mg/dm^3;

Concentration of oil and oil products in the composition of formation waters in the case of the “IKHLAS-1” does not exceed 46 mg/dm^3.

Calculation of the actual annual economic effect from the implementation of “IKHLAS-1”:

Annual consumption of “Dissolvan V 5748” (186 x 116,340)/1,000,000 = 21.6 tons;

Cost of 21.6 tons of “Dissolvan V 5748” 1,859,200 x 21.6 = 40,158,720 tenge

Annual consumption of “IKHLAS-1” (170 x 116,340)/1,000,000 = 19.8 tons

Cost of 19.8 tons of “IKHLAS-1”: 1,394,400 x 19.8 = 27,609,120 tenge

Actual annual economic effect from the implementation of “IKHLAS-1”:

40,158,720 - 27,609,120 = 12,549,600 tenge ($27,859)

Results:

1. The actual annual economic effect from the implementation of “IKHLAS-1” at the “Tenge Oil & Gas” field is Gas” is 12,549,600 tenge ($27,859);

2. The level of reduction of the concentration of oil and oil products in the composition of formation waters from 370-1290 mg/dm^3 to 46 mg/dm^3 (18 times reduction on average) meets the requirements of the reservoir pressure maintenance (oil in the composition of formation waters no more than 50 mg/dm^3).

3. Calculation of the actual annual economic effect from the introduction of the nanodemulsifier "IKHLAS-1" at the "Phystech II" JSC field

Initial data:

In the period from 12.04.17 to 17.04.17, pilot tests of the nanodemulsifier "IKHLAS-1" were carried out at the "Phystech II" JSC field. Since the beginning of 2018, the nanodemulsifier "IKHLAS-1" is successfully implemented at the "Phystech II" JSC field;

Base demulsifier: "SNPKh-4315D" (Russia);

The cost of one ton of "SNPKh-4315D" is 1,801,100 tenge;

The cost of one ton of "IKHLAS-1"; 1,394,400 tenge;

The volume of annual oil production: 156,950 tons;

Average specific consumption of the basic demulsifier "SNPKh-4315D" 221 g/t;

Average specific consumption of the nanodemulsifier "IKHLAS-1" 100 g/t;

Concentration of oil and oil products in the composition of formation waters of "SNPKh-4315D" is 200-470 mg/dm^3;

Concentration of oil and oil products in the composition of formation waters "IKHLAS-1" does not exceed 47.8 mg/dm^3.

Calculation of the actual annual economic effect from the implementation of "IKHLAS-1":

Annual consumption of "SNPKh-4315D" (221 x 156,950)/1,000,000 = 34.7 tons;

Cost of 34.7 tons of "SNPKh-4315D" 1,801,100 x 34.7 = 62,498,170 tenge;

Annual consumption of "IKHLAS-1" (100 x 156,950)/1,000,000 = 15.7 tons;

Cost of 15.7 tons of "IKHLAS-1": 1,394,400 x 15.7 = 21,892,080 tenge;

Actual annual economic effect from the implementation of "IKHLAS-1": 62,498,170 - 21,892,080 = 40,606,090 tenge ($90,143).

Results:

1. Actual annual economic effect from the implementation of "IKHLAS-1" at the "Phystech" field II" JSC is 40,606,090 tenge ($90,143)

2. The level of reduction of the concentration of oil and oil products in the composition of formation waters from 200-470 mg/dm^3 to 47.8 mg/dm^3 (7 times reduction on average) meets the requirements of the reservoir pressure maintenance (oil in the composition of formation waters no more than 50 mg/dm^3).

4. Calculation of the actual annual economic effect from the introduction of the nanodemulsifier "IKHLAS-1" at the Akkulka field of TetisAralGaz LLC

Initial data:

In the period from 14.08.17 to 26.08.17, pilot tests of the nanodemulsifier "IKHLAS-1" is successfully implemented at the Akkulka field of TethysAralGaz

LLC. Since the beginning of 2018, the nanodemulsifier “IKHLAS-1” is successfully introduced at the Akkulka field of TethysAralGaz LLC.

Base demulsifier: “DMO-86520” (“Baker Hughes”, USA);

The cost of one ton of “DMO-86520” is 2,440,200 tenge;

The cost of one ton of “IKHLAS-1”; 1,394,400 tenge;

The volume of annual oil production: 254,405 tons;

The average specific consumption of the base demulsifier “DMO-86520” is 69.6 g / t;

Average specific consumption of nanodemulsifier “IKHLAS-1” is 40.4 g/t;

Concentration of oil and oil products in the composition of formation waters “DMO-86520” is 62-137 mg/dm3;

Concentration of oil and oil products in the composition of formation waters “IKHLAS-1” does not exceed 28 mg/dm^3.

Calculation of the actual annual economic effect from the implementation of “IKHLAS-1”:

Annual consumption of “DMO-86520” (69.6 x 254 405)/1 000 000 = 17.7 tons;

Cost of 17.7 tons of “DMO-86520” 2,440,200 x 17.7 = 43,191,540 tenge

Annual consumption of “IKHLAS-1” (40.4 x 254,405)/1,000,000 = 10.2 tons

Cost of 10.2 tons of “IKHLAS-1”: 1,394,400 x 10.2 = 14,222,880 tenge

Actual annual economic effect from the implementation of “IKHLAS-1”:

43,191,540 - 14,222,880 = 28,968,660 tenge ($64,309)

Results:

1. Actual annual economic effect from the implementation of “IKHLAS-1” on the deposit "Akkulka" of TOO "TetisAralGaz" is 28,968,660 tenge ($64,309).

2. The level of reduction of concentration of oil and oil products in the composition of formation waters from 62-137 mg/dm^3 to 28 mg/dm^3 (3 times reduction on average) meets the requirements of the reservoir pressure maintenance (oil in the composition of formation waters no more than 50 mg/dm^3).

5. Calculation of the actual annual economic effect for nanodemulsifiers "IKHLAS-1" and "IKHLAS-2" at the fields and OPPSh (oil preparation and pumping shop) of OGPD (oil and gas production department) "Zhaikmunaigas" of JSC "Embamunaigas"

Initial data:

In the period from 06.01.18 to 25.01.18, pilot tests of nanodemulsifiers "IKHLAS-1" and "IKHLAS-2" were carried out at the fields and OPPSh of OGPD "Zhaikmunaigas" of JSC "Embamunaigas". Since the beginning from 01.07.19, the "IKHLAS-1" and "IKHLAS-2" nanodemulsifiers are successfully implemented at the OPPSh of OGPD "Zhaikmunaigas" of JSC "Embamunaigas";

Basic demulsifiers: "Dissolvan V 4795" and "Dissolvan V 4397" (Germany);

The cost of one ton of "Dissolvan V 4795" and "Dissolvan V 4397" is 1,859,200 tenge;

The cost of one ton of "IKHLAS-1" and "IKHLAS-2": 1,394,400 tenge;

The volume of annual oil production: 931,115 tons;

The average daily consumption of basic demulsifiers is 89.94 x 2 = 179.88 kg.

The average daily consumption of nanodemulsifiers "IKHLAS-1" and "IKHLAS-2": 89.94 kg

The concentration of oil and oil products in the composition of formation waters "Dissolvan V 4795" and "Dissolvan V 4397" is 50-400 mg/dm^3;

The concentration of oil and oil products in the formation waters of "IKHLAS-1" does not exceed 15-50 mg/dm^3.

Calculation of the actual annual economic effect for "IKHLAS-1" and "IKHLAS-2":

Total annual consumption of base demulsifiers: 179.88 x 365 = 65,656 kg = 65.656 tons;

Total annual consumption of demulsifiers "IKHLAS-1" and "IKHLAS-2": 89.94 x 365 = 32,828 kg = 32.828 tons;

Cost of 65.656 tons of base demulsifiers "Dissolvan V 4795" and "Dissolvan V 4397": 65.656 x 1,859,200 = 122,067,635 tenge;

The cost of 32,828 tons of nanodemulsifiers “IKHLAS-1” and “IKHLAS-2”: 32, 828 x 1,394,400 = 45,775,363 tenge;

Annual actual economic effect: 122,067,635 - 45,775,363 = 76,292,272 tenge ($169,365).

Results:

1. The annual actual economic effect for nanodemulsifiers “IKHLAS-1” and “IKHLAS-2” at the fields and OPPSh of OGDU “Zhaikmunaigas” of JSC “Embamunaigas” is 76,292,272 tenge ($169,365).

2. The level of reduction of the concentration of oil and oil products in the composition of formation waters from 50-400 mg/dm^3 mg/l to 15-50 mg/dm^3 (6.9 times reduction on average) meets the requirements of the reservoir pressure maintenance (oil in the composition of formation waters no more than 50 mg/dm^3).

6. Calculation of the actual annual economic effect for the nanodemulsifier “IKHLAS-1” at the “Karsak” Central Processing Plant and the “Botakhan” field of the “Dossormunaigas” Oil and Gas Production Department (OGPD) of “Embamunaigas” JSC

Initial data:

In the period from 02.02.2019 to 12.02.2019, pilot tests of IKHLAS-1 nanodemulsifiers were conducted at the “Karsak” OPPSh and the “Botakhan” field of the “Dossormunaigas” OGPD of “Embamunaigas” JSC. Since the beginning from 01.07.19, the “IKHLAS-1”, nanodemulsifier is successfully implemented at the “Karsak” OPPSh and the “Botakhan” field of the Dossormunaigas OGPD of “Embamunaigas” JSC;

Base demulsifier: “Dissolvan V 4795” (Germany);

The cost of one ton of “Dissolvan V 4795”: 1,859,200 tenge;

The cost of one ton of “IKHLAS-1”: 1,394,400 tenge;

The volume of annual oil production: 151,840 tons;

Average daily consumption of base demulsifier 78.1+16.9= 95 kg.

Average daily consumption of nano demulsifier “IKHLAS-1”: 46.1+14=60.1 kg

Concentration of oil and oil products in formation water “Dissolvan V 4795” is 50-400 mg/dm^3;

Concentration of oil and oil products in formation water “IKHLAS-1” does not exceed 29 mg/dm^3;

Calculation of actual annual economic effect for “IKHLAS-1”: Total annual consumption of base demulsifier: 95 x 365 = 34,675 kg = 34.675 t;

Total annual consumption of demulsifier “IKHLAS-1”: 60.1 x 365 = 21,936 kg = 21.936 tons;

Cost of 34,675 tons of basic demulsifier “Dissolvan V 4795”: 34,675 x 1,859,200 = 64,467,760 tenge;

Cost of 21.936 tons of nanodemulsifiers “IKHLAS-1”: 21,936 x 1,394,400 = 30,587,558 tenge; Expected annual economic effect: 64,467,760 - 30,587,558 = 33,880,202 tenge ($75,212).

Results

1. The annual actual economic effect for the “IKHLAS-1” nanodemulsifier at the “Karsak” OPPSh and the “Botakhan” field of the “Dossormunaigas” OPPSh of “Embamunaigas” JSC is 33,880,202 tenge ($75,212).

2. The level of reduction of the concentration of oil and oil products in the composition of formation waters from 73 mg/dm^3 to 29 mg/dm^3 (2.5 times reduction on average) meets the requirements of the reservoir pressure maintenance (oil in the composition of formation waters no more than 50 mg/dm^3).

7. Conclusion

Thus, the sum of the annual actual and expected economic effects from the implementation of nanoecological technologyusing demulsifiers with polynanostructure type "IKHLAS", in the conditions of primary preparation of oil at some of the above-mentioned oil fields of the Republic of Kazakhstan is $604,402 and $2,272,610, respectively (there is an official approved document). At the same time, the level of contamination of waste formation water with oil was 2.5-42 times lower in comparison with basic technologies and did not exceed the standard levels (50 mg/dm^3).

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ANALYSIS OF THE USE OF COMPOSITE MATERIALS IN AVIATION AND THEIR CONTACT DAMAGE UNDER VIBRATION CONDITIONS

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Annotation. *The article analyzes the use of composite materials in the structures of modern aircraft. It is established that the latest generation of aircraft is characterized by the use of ultralight and high-strength materials, in particular carbon fiber, fiberglass and titanium alloys. The widespread introduction of such materials necessitates the creation of a significant number of joints between composite materials and titanium parts. Given that vibration loads are an integral factor in the normal operation of aircraft, damage to contact zones due to fretting wear is increasingly recorded in modern aircraft. The most vulnerable are joints of titanium alloys with composite materials, where vibration microdisplacements lead to destruction of surface layers and a decrease in the durability of the structure due to the appearance of cracks in the metal parts of the structure. The formation of microcracks leads to damage to surfaces and, as a result, without proper*

maintenance, to a sharp loss of joint strength, which in turn leads to the destruction of structures and the emergence of catastrophic situations with consequences. The article analyzes the mechanisms of damage to contact pairs "titanium alloy - composite material" under the influence of vibration loads. It is determined that a promising direction for increasing the wear resistance of assemblies is the implementation of technological measures to strengthen titanium parts and the use of intermediate materials in contact zones. In particular, the use of gas-thermal coating methods provides a multiple (tens of times) increase in the wear resistance of contacts and changes the nature of wear: from the destruction of titanium elements to the controlled wear of composite materials. This approach contributes to increasing the reliability and service life of connections in the structures of modern aircraft without maintenance and transferring equipment to maintenance according to the actual condition.

Keywords: *aviation, titanium alloys, carbon fiber, fiberglass, vibration, damage, analysis, durability.*

Problem statement. Composite materials are among the most sought-after resources in modern aircraft engineering. One of the key problems in the industry is to reduce the mass of an aircraft structure while ensuring the necessary strength and rigidity. The use of composite materials, along with titanium alloys, allows for a significant reduction in the mass of aircraft, which directly affects fuel consumption. The specific strength of such materials significantly exceeds the characteristics of traditional metal alloys [1].

In modern aircraft engineering, composite materials are used in the structures of many aircraft. A prime example is the Boeing 787 Dreamliner, the first commercial aircraft in which the main structural elements are made of composite materials [2], rather than aluminum alloys. This aircraft has implemented a transition from fiberglass composite materials to more modern carbon laminates and sandwich composites. According to calculations [3], the use of composite materials in the Boeing 787 Dreamliner provides a 20% reduction in the mass of structural elements.

For comparison, reducing the weight of the Airbus A340-300 aircraft structure by 20 % allows for a reduction in fuel consumption by 8,660 kg during a flight of 10,000 km, which corresponds to a saving of about 9–10,000 euros depending on the region.

However, the widespread use of composite materials in combination with titanium alloys under operational loads and engine vibrations leads to damage and loss of service life even in units that are nominally considered stationary. The number of such connections in modern aircraft reaches thousands of contact points, which makes the problem of ensuring their durability and reliability urgent.

The purpose of this work is a comprehensive analysis of the use of composite materials in the structures of modern aircraft and the study of characteristic damage in contact pairs "composite material - titanium alloy". Special attention is paid to units where titanium alloys are widely used in connections with composite materials, which is due to their widespread use in modern aircraft construction.

Analysis of the use and damage of composite materials in aviation. Composite materials occupy a leading position in modern aircraft construction due to the combination of high specific strength and low density. The most common among them are fiberglass and carbon fiber, which provide a significant reduction in the mass of aircraft structures while maintaining the necessary operational characteristics.

Fiberglass has been widely used due to its high corrosion resistance and ability to withstand alternating loads. They are easily machined, which contributed to their use in the first power structures of aircraft. In particular, fiberglass was used to make fuselage and wing elements, as well as high-pressure cylinders. The main disadvantage of fiberglass is the decrease in mechanical properties in an aqueous environment, which is associated with the weakening of the bond between glass fibers and the polymer matrix. In modern conditions, fiberglass is considered to be a previous generation material, although it is still used in a number of aircraft structures.

Carbon fiber composites are gradually replacing fiberglass due to the combination of lower weight and high strength. Carbon laminates and sandwich

composites are characterized by increased stiffness, fatigue resistance and better performance properties. Their use allows for a significant reduction in the weight of aircraft structures, which directly affects fuel economy and flight efficiency.

At the same time, the use of composite materials in combination with titanium alloys creates new challenges for the aviation industry. Under operational loads and vibrations from engines, damage occurs in the contact zones, leading to loss of service life even in units that are nominally considered stationary. The number of such joints in modern aircraft reaches thousands, which makes the problem of ensuring their durability and reliability urgent.

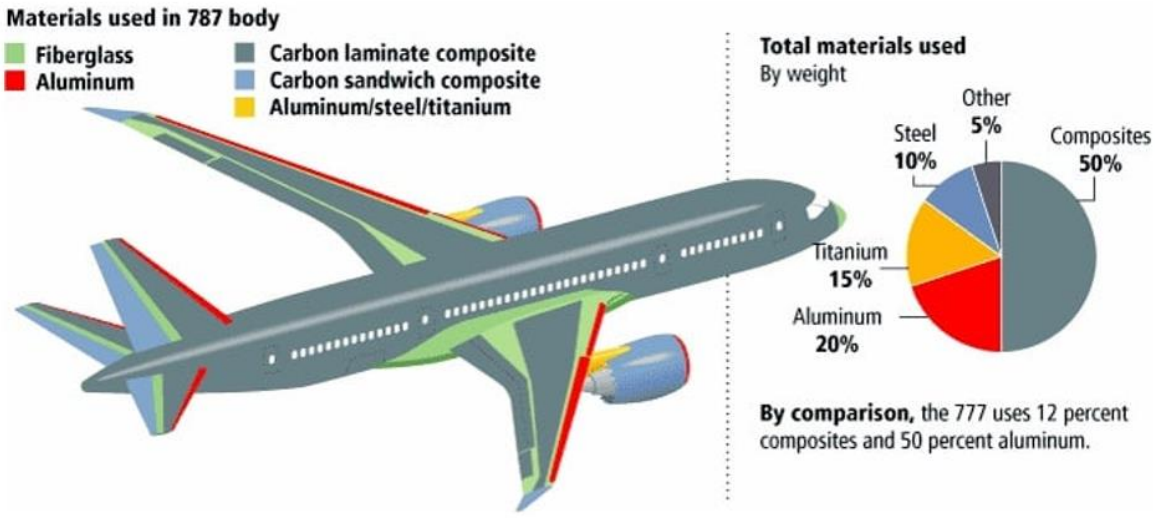

Fig. 1. Use of materials in the Boeing 787 Dreamliner [2]

Carbon fiber composites are the most promising type of composite materials for aviation and space technology. Their key advantages are determined by high specific strength and stiffness, heat resistance, and corrosion resistance. Composite materials based on epoxy binders are capable of operating for a long time at temperatures up to 200 °C, and materials based on organosilicon resins - up to 300 °C. Due to the high electrical conductivity of carbon fiber, carbon fiber composites can perform antistatic protection functions, which expands their functional capabilities.

The combination of these properties has led to the widespread use of carbon fiber composites in aircraft structures. Their exceptional rigidity makes the material

ideal for the manufacture of large-sized parts, in particular wing elements. In addition, the technology for forming carbon fiber structures allows you to reduce the number of connections made using screws or rivets, which reduces the need for regular technical control and maintenance. An important advantage is also resistance to moisture and corrosion, which distinguishes carbon plastics from traditional metal materials. Thus, carbon plastics combine lightness, strength, heat resistance and functionality, which makes them one of the key materials for the new generation of aviation industry. Fig. 2 shows examples of aviation parts made of composite materials [4].

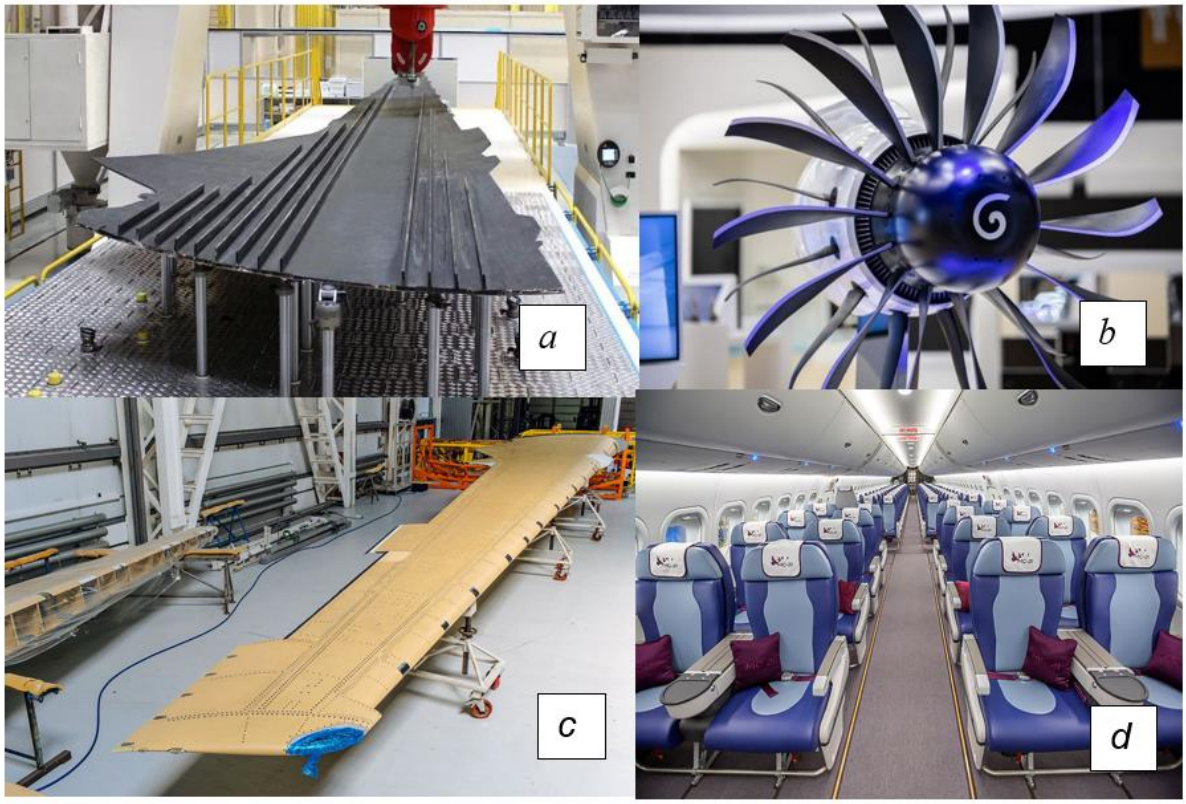

Fig. 2. Examples of manufacturing parts from composite materials for aviation: a – aircraft wing panel (carbon fiber), b – aircraft engine propeller (carbon fiber), c – aircraft wing (fiberglass), d – aircraft interior (PAEK, PEEK, PEI, PTFE) [4]

The moving elements of the tail and ailerons of modern aircraft have a multilayer structure, which provides increased torsional resistance. Such structures are formed on the basis of a cellular filler made of Kevlar aramid fiber, located

between layers of carbon fiber. The areas of connection of the wings with the fuselage are traditionally made of fiberglass, which are characterized by high strength.

Airbus airline uses aramid fiber to strengthen the wings of the A320 aircraft, which provides resistance to various operational factors. Boeing in the 777X series uses composite wings with a span of 72 m, which, thanks to a system of titanium hinges, can be folded in the parking lot, reducing the span by 7 m. This is an example of an effective combination of the properties of titanium alloys and composites.

Modern polymer technologies are also actively introduced into aviation. Solvay has developed a polymer film with a copper mesh to dissipate electrostatic charges and improve aerodynamics. In collaboration with Lufthansa and BASF, a polymer coating with a microprismatic structure has been created that reduces air resistance. Applying such a film with an area of 950 m^2 allows saving up to 400 tons of fuel annually and reducing CO_2 emissions by 1,200 tons. If implemented globally, this technology could save about 5 million tons of fuel per year.

Composite materials based on epoxy resins are used in the front parts of jet engines to reduce fuel consumption. The use of polymers (PEEK, carbon fiber) in the blades of CFM's LEAP engine has allowed for a weight reduction of 450 kg compared to the previous generation, which resulted in a 30% reduction in fuel consumption.

Polymers also play an important role in creating aircraft interiors: overhead compartments, bulkheads, service carts and seats. PEI-based materials are used for large parts due to their fire safety, and polyamides with flame retardants are used for small fasteners. Replacing aluminum parts with PEI and carbon fiber products allows you to reduce the weight of the structure by tens of kilograms.

Airbus has developed a seat with a titanium and carbon fiber frame weighing only 4 kg, which is almost half the weight of traditional seats. This is the first CAA-certified carbon fiber seat, which is already used in A320 and Boeing 737 aircraft.

Safran has created a new type of propeller for aircraft gas turbine engines with a diameter of 4 m, made of carbon fiber. Thanks to the flexibility of the blades, it was

possible to reduce noise levels to the level of the LEAP engine and provide an additional reduction in fuel consumption by 15-25%.

Analysis of damage to composite materials with titanium alloys during vibrations. The aviation industry is constantly improving, and contacts between composite materials and titanium alloys are becoming increasingly common in the structures of modern aircraft. Since the structural elements are in the field of vibration loads, even nominally fixed connections undergo microdisplacements, which leads to damage. This is especially relevant given the low antifriction properties of titanium alloys and the high strength of reinforced fibers of composite materials. A review of the literature [10–15] shows that under vibration conditions, microdisplacements occur in contact pairs, which cause damage to both titanium parts and composite materials. Works [16–20] show that the wear resistance of titanium alloys in such contacts can be up to 10 times lower compared to reinforced glass fiber and carbon composites. The main problem is the formation of fatigue cracks in titanium alloys due to fretting corrosion, which can lead to a sharp loss of strength and structural failure.

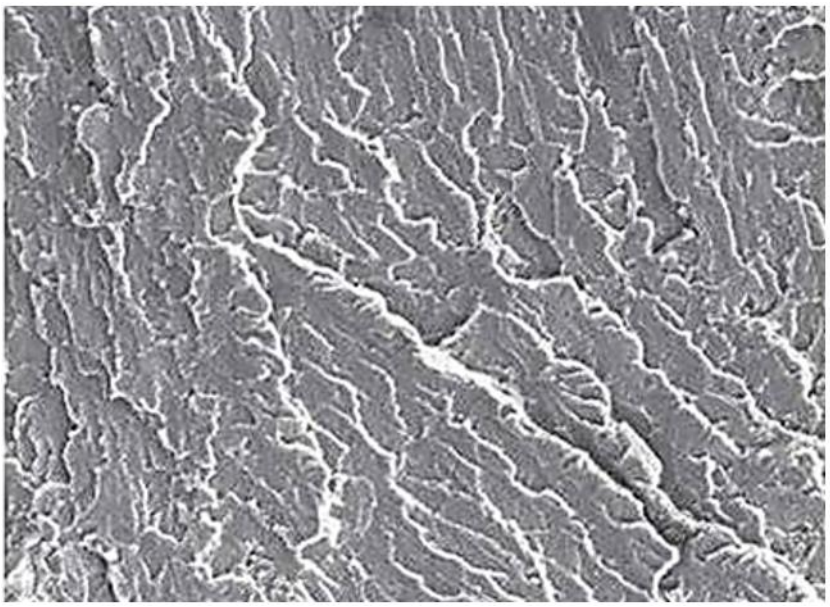

Fig. 3. Shows examples of damage to titanium alloys in contact with composite materials during fretting corrosion

Ways to increase the durability of contact pairs:

- application of technological methods for strengthening titanium parts [21–24], which allows increasing their wear resistance to the level of composites;

- use of antifriction intermediate materials [21, 22];

- application of special wear-resistant coatings [23–33].

In particular, gas-thermal and galvanic coatings based on chromium or molybdenum can increase the wear resistance of titanium parts in contact with composite materials by up to 20 times, ensuring the balance and durability of the assembly.

Conclusions. Thus, the use of composite materials in modern aircraft tends to grow steadily, which is accompanied by an increase in the number of their contacts with titanium alloys. Under operational and vibration loads, such joints are inevitably damaged, even if they are nominally considered immobile. The main risk is the formation of fretting corrosion and fatigue cracks in titanium parts, which can lead to loss of strength and structural failure.

The use of a controlled approach to the design and operation of contact zones, as well as the use of technological methods for preparing the surfaces of titanium alloys and composite materials, allows you to significantly increase the durability of such units. The implementation of these measures ensures the possibility of operating joints without frequent maintenance, which reduces the cost of maintaining aviation equipment and at the same time increases the service life and reliability of structures.

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NURTURING DEVELOPMENT - THE ROLE OF PERSONAL PSYCHOLOGY AND FAMILY DYNAMICS IN THE NUTRITIONAL MANAGEMENT OF CHILDHOOD OBESITY

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Abstract. *Obesity during childhood and adolescence is recognized as a major and growing global public health issue (WHO, 2022). Childhood overweight conditions are structurally linked to severe long-term physiological complications. Increasingly, evidence indicates that early-life obesity drastically alters endocrine-metabolic programming, posing significant risks to physiological development and future reproductive health. While traditional methods have predominantly centered on mechanical caloric restrictions or automated digital tracking tools, these approaches often fall short in supporting long-term lifestyle modifications during crucial developmental phases. Obesity rates have tripled since 1975 and have become a global health epidemic, with nearly 60% of adults and one in three children in the European region being affected by being overweight (WHO, 2022).*

To mitigate these severe metabolic and reproductive consequences, sustainable adherence to nutritional interventions is required. This article proposes a human-centric framework comprising the child's individual psychology, direct human therapeutic mediation, and systemic family dynamics as critical supportive tools for achieving this adherence.

This article proposes a human-centric framework that shifts the focus from physical/nutritional management to a relational triad comprising the child's individual psychology, direct human therapeutic mediation, and systemic family

dynamics. Drawing from robust longitudinal and psychological data originally observed in adult bariatric populations where long-term weight regains and high rates of secondary surgical revisions highlight the consequences of neglecting psychosocial and environmental variables (State Comptroller's Office, 2019; Sukran et al., 2017), this model translates critical indicators into proactive strategies.

Utilizing the BariLifestyle personality assessment (BariPA) framework outlines how childhood traits dictate specific emotional eating patterns and behavioral adherence. Furthermore, the framework conceptualizes the family unit as an active, supportive team, essential for sustaining both intrinsic and extrinsic motivation.

By deploying these psychological and relational tools, clinicians can significantly improve nutritional adherence, thereby correcting adverse endocrine-metabolic trajectories and safeguarding future reproductive wellbeing

1. INTRODUCTION

Over the past several decades, obesity has become a global health epidemic, exhibiting dramatic increases in prevalence across all demographics. Current estimates indicate that nearly 60% of adults and one in every three children within the World Health Organization (WHO) European Region are actively affected by overweight and obesity. According to the WHO European Regional Obesity Report 2022, these trajectories are projected to worsen significantly, with childhood obesity expected to increase by an additional 60% over the next decade, driving global medical costs associated with obesity past the shattering threshold of $1 trillion by the year 2025 (WHO, 2022).

The clinical consequences of early-life obesity extend far beyond cosmetic concerns; childhood and adolescent overweight are structurally linked to severe long-term physiological complications, including type 2 diabetes and early-onset cardiovascular diseases. Crucially, early-life obesity drastically alters endocrine-metabolic programming, posing severe risks to physiological development and threatening future reproductive health. These early-life metabolic disruptions lead to

persistent health challenges in adulthood, severely compromising comprehensive wellbeing—a state of total social, economic, and mental prosperity.

Traditional methodologies addressing children's weight management have historically relied on mechanical frameworks, predominantly focusing on stringent caloric restriction, structured dietary plans, or intense aerobic exercise regimens. In the modern era, this mechanical paradigm has frequently been augmented or replaced by automated digital technologies, such as mobile applications, wearable activity trackers, and artificial intelligence algorithms designed to monitor caloric intake and physical output autonomously. However, empirical literature demonstrates that these non-surgical, isolated treatments routinely yield limited long-term success. Patients are frequently unable to adopt or maintain the necessary lifestyle modifications over extended periods, typically achieving transient weight reductions of only 5% to 10% before experiencing relapse (Sukran et al., 2017).

To understand the persistent limitations of these mechanical and digital interventions, valuable insights can be extracted from the study of adult bariatric populations. Bariatric surgery is widely recognized as the most effective anatomical procedure for inducing rapid weight loss and mitigating obesity-related comorbidities in severe cases. Yet, even after undergoing these profound surgical alterations, long-term postoperative care and lifestyle maintenance remain an immense lifelong challenge. Longitudinal data reveal that more than 60% of post-surgery bariatric patients regain significant weight within four years on average (State Comptroller's Office, 2019).

Furthermore, the rate of repeat revisionary operations is remarkably high in environments where post-surgical holistic care is under-managed. The number of repeat operations in Israel is among the highest in the world, affecting approximately 17% of patients compared to a global average of only 7%. The high rate of weight regain and surgical failure in adults has been structurally linked by researchers to a systemic neglect of pre- and post-operative psychological care, behavioral tracking, and socio-environmental support mechanisms (State Comptroller's Office, 2019). When weight loss is treated as a purely physical or clinical metric, the underlying

cognitive, emotional, and relational habits remain unaddressed, inevitably leading to behavioral relapse (Sukran et al., 2017).

This phenomenon underscores an urgent lesson for childhood care: if severe physiological and structural interventions fail in adults without robust psychosocial support, then purely mechanical or automated digital interventions in children are fundamentally ill-equipped to succeed. Children and adolescents reside within a highly fluid, critical stage of cognitive, emotional, and social development. Consequently, a paradigm shift is required to safeguard their metabolic and reproductive futures. To correct adverse endocrine trajectories, pediatric patients must achieve sustainable adherence to nutritional modifications. This adherence necessitates moving toward a proactive, human-centric framework that positions the personal psychology of the child and the systemic relational dynamics of the family unit as the foundational, supportive mechanisms of clinical intervention.

2. THE PERSONALITY-DRIVEN FRAMEWORK IN CHILDHOOD CARE

It is widely established that a cornerstone of sustainable health behavior modification is the clinical recognition of distinct psychological variations that dictate how patients manage stress, adhere to medical guidelines, and integrate dietary adaptations. Addressing this need, the BariLifestyle Personality Assessment (BariPA) offers a unique, scientifically grounded framework tailored for individual pre- and post-bariatric intervention. The BariPA evaluates multi-layered psychological aspects and long-term readiness by evaluating specific five traits. Through a specialized questionnaire structure that maps individual profiles across the five personality domains, the assessment deciphers the underlying cognitive and emotional mechanisms that enable severely overweight individuals to successfully navigate their lifelong lifestyle and weight maintenance journey. In the pediatric context, mastering these psychological mechanisms is not merely about weight management; it is the fundamental prerequisite for halting adverse endocrine trajectories and reversing metabolic dysfunction.

The BariPA provides an understanding of individual differences and tendencies, while taking close attention to the issue relative to obesity, such as health and wellbeing behavior patterns, social and environment influence capabilities, eating habits and Openness willingness for changing. The new BariPA model offers interesting feedback and reflection on the personality, recognizing that these traits can change and develop over time. By emphasizing stability and change, pre- and post-bariatric patients can monitor their personal growth and development, set goals for self-improvement, and utilize their strengths to overcome challenges over life and set their new lifestyle.

The majority of these individual variations can be systematically categorized utilizing personality neuroscience, which isolates core domains such as Extraversion, Neuroticism, Agreeableness, Conscientiousness, and Openness/Intellect (DeYoung, 2010). These domains describe foundational tendencies in human cognition and emotion that predict health behaviors and adaptation. In adult populations, distinct correlations have been established between these personality traits and long-term behavioral outcomes.

When translating these psychological principles into childhood nutritional management, the clinician must engage in direct, person-to-person psychological assessment to map the unique profile of the child. Mapping these traits allows for a highly customized, human-mediated therapeutic approach designed to foster the adherence necessary to protect future reproductive health:

- Neuroticism and Emotional Eating: Children scoring high in the domain of neuroticism exhibit an elevated tendency to experience pervasive negative emotions, including anxiety, depression, anger, and psychological vulnerability. These unstable emotional states can potentially lead to non-compliance with instructions and trigger severe emotional eating patterns as a coping mechanism. This emotional eating directly fuels glycemic volatility and disrupts metabolic homeostasis. Effective nutritional management for these children mandates direct, human-to-human cognitive-behavioral therapy (CBT) techniques delivered by a clinician. By stabilizing emotional responses, CBT ensures the dietary consistency required to

restore endocrine balance and improve overall happiness outcomes (Hjelmesæth et al., 2018).

- **Conscientiousness and Self-Efficacy**: Children patients characterized by higher levels of conscientiousness naturally possess a greater capacity for self-discipline, order, and routine adherence, which strongly predicts behaviors that promote health and longevity. In a human-centric clinical setting, the practitioner can actively leverage this trait to cultivate the child's sense of self-efficacy—their psychological confidence in their ability to execute behavioral changes. By shunning unrealistic, sweeping restrictions and instead collaboratively establishing small, highly structured, and achievable daily goals, the clinician reinforces the child's motivation, celebrating incremental victories to foster deep-seated commitment. This highly structured commitment is the physiological anchor required for long-term metabolic correction and the protection of physiological development.

- **Extraversion and Socialized Support**: Children high in extraversion are naturally assertive, talkative, and socially oriented (DeYoung, 2010). A human-centric model utilizes their extraverted nature by embedding them into physical, instructor-led peer support groups. Direct group interaction satisfies their need for social engagement while building a shared sense of collective support, a factor strongly correlated with weight loss outcomes and long-term behavioral maintenance. Sustaining these behavioral modifications collectively prevents the relapse of adverse endocrine programming (Livhits et al., 2010).

Conceptual Caution and Future Research Directions

It is fundamental to note that the application of the BariPA Model to pediatric populations within this framework is conceptual and theoretical in nature. While the biological and psychological infrastructure of these traits is well-documented in adult weight-management contexts, children are in a continuous state of fluid cognitive, emotional, and behavioral development. Unlike adult populations where personality traits exhibit structural stability and interventions are primarily management-oriented, pediatric personality dimensions possess higher levels of developmental plasticity.

Consequently, clinician-mediated cognitive-behavioral interventions (CBT) should not merely adapt to static baseline traits but actively reshape maladaptive emotional regulation mechanisms early in life. Reshaping these mechanisms provides the stable metabolic and behavioral foundation essential for healthy puberty and future reproductive capabilities. This model therefore serves as a preliminary theoretical proposition rather than a definitive diagnostic tool. Future empirical research and longitudinal studies are strictly required to systematically investigate, refine, and adapt the behavioral traits dimensions specifically for children and adolescents, ensuring that personality-driven nutritional strategies align accurately with the psychological realities of each developmental stage.

3. PEER VICTIMIZATION, RESILIENCE, AND POSITIVE MINDSET

Beyond individual psychological traits, the social reality confronting overweight children and adolescents is heavily saturated with external psychological stressors. Extensive data reveal that early-life overweight is tightly correlated with profound psychosocial consequences, including pervasive social exclusion, teasing, peer victimization, and systematic social stigmatization (Puhl et al., 2020). Quantitative surveys show that an overwhelming majority of individuals struggling with severe weight challenges report being explicitly bullied during their youth because of their body mass. Victimization due to obesity is deeply associated with severe mental health outcomes, persistent body dissatisfaction, and low self-esteem that stretches into adulthood (Bertoletti et al., 2019).

Crucially, this chronic psychosocial trauma is not merely an emotional burden; it acts as a severe biological stressor. Persistent victimization and social exclusion elevate cortisol levels and systemic inflammation, directly exacerbating insulin resistance and further disrupting the child's endocrine-metabolic programming. A human-centric triad framework dictates that clinical teams must intervene directly to address this trauma during the child's developmental years, rather than treating the residual psychiatric and metabolic scars in adulthood.

Genuine psychological resilience and behavioral modification require the deliberate cultivation of a positive mindset, mediated entirely through empathetic human relationships. Drawing from large-scale thematic analyses of over 6,000 successful weight-loss maintainers, research underscores a powerful correlation between a structured positive mindset and successful long-term weight-loss maintenance (Phelan et al., 2022). A critical finding within this data centers on how individuals perceive and respond to behavioral setbacks or dietary failures. Individuals guided by an optimistic, human-mediated psychological framework learn to reframe setbacks not as permanent character flaws, but as transient breaks or natural, educational steps within a broader lifetime journey (Phelan et al., 2022).

By practicing intentional gratitude, focusing on self-worth, and establishing highly realistic, day-by-day progression scales, the human clinician serves as an essential emotional buffer. This interpersonal guidance reframes the child's internal narrative, shifting it away from self-limiting beliefs and toward an active, responsible, and highly resilient mindset capable of sustaining long-term health behavior. By actively buffering the child against chronic social stress, this clinician-mediated resilience effectively mitigates cortisol-driven metabolic damage, facilitating the physiological and hormonal stability necessary to protect future reproductive health.

4. SYSTEMIC DYNAMICS: THE FAMILY UNIT AS THE MOTIVATIONAL ANCHOR

Nutritional management of childhood obesity aimed at reversing adverse endocrine trajectories can never succeed if it is conceptualized as an isolated, individual task forced upon the child. Extensive literature reviews of family-based health interventions demonstrate that the physical recovery, emotional balance, and lifestyle adherence of pediatric patients—the exact mechanisms required to stabilize metabolic hormones—are entirely dependent on the understanding, acceptance, and active participation of the surrounding family structure (Lent et al., 2016).

For a child to achieve lasting lifestyle adaptation and protect their future reproductive health, the journey must be explicitly re-framed as a cohesive, joint family team experience, characterized by shared emotional health goals, synchronized modifications in eating habits, and the creation of a fundamentally positive home environment.

Introducing comprehensive dietary overhauls into a household to correct hormonal imbalances is a psychologically complex process that inevitably disrupts established domestic routines. Just as profound weight changes in adult bariatric patients have been proven to cause significant, often paradoxical disruptions within marital relationships, doubling the statistical probability of divorce or separation due to shifting power dynamics, role conflicts, and acute domestic strain (King et al., 2022), altering a child's nutritional ecosystem triggers severe "systemic stress" across the family structure.

Disagreements frequently arise between parents and children regarding food purchasing, meal preparation, and the restriction of hyper-palatable options. If the child feels uniquely targeted or punished by these new rules, the resulting emotional friction often leads to dietary rebellion, instantly triggering the glycemic spikes and metabolic volatility the intervention seeks to prevent.

This domestic friction is frequently amplified by deep-seated cultural, geographic, and socio-environmental factors (Keinan-Boker et al., 2005).

In specific societal contexts, such as traditional Middle Eastern hospitality paradigms, social and familial interactions are deeply intertwined with the continuous serving of abundant, highly varied, and calorie-dense food options as a primary expression of respect and affection. Within such environments, an individual child attempting to follow a restrictive nutritional plan faces immense social pressure and immediate friction during family gatherings, where refusing food can be culturally misinterpreted as a rejection of hospitality. This social pressure frequently causes the child to abandon metabolic protocols simply to maintain domestic harmony.

This necessitates systemic, family-centric counseling that empowers parents to act as cultural mediators, reframing nutritional choices within the household without

alienating the child from essential community ties, thereby safeguarding their dietary adherence and endocrine stability. To overcome these barriers, the clinical team must implement family-centric counseling. Working directly with parents to co-create a supportive, positively adapting social structure directly fuels the child's internal drive. This establishes a highly correlated link between strong social-family relationships and the high levels of sustained patient motivation necessary to secure a healthy reproductive future (Conceição et al., 2019).

5. FUNCTIONAL MOVEMENT ADAPTATION FOR CHILDREN WELLBEING

A holistic approach to childhood nutritional management requires a highly synchronized integration of physical activity tailored precisely to the physiological and emotional realities of an overweight child. Crucially, this physical integration must not be viewed merely as a mechanism for caloric expenditure; rather, it is a vital clinical tool for enhancing insulin sensitivity and restoring endocrine homeostasis. Historically, standard clinical protocols have overwhelmingly emphasized traditional, intense aerobic-centric approaches, such as prolonged running, cycling, or algorithmic cardiovascular tracking metrics.

However, empirical sports science demonstrates that these high-intensity, aerobic-dominant paradigms frequently yield limited success and poor long-term adherence in bariatric and severely overweight populations. Furthermore, forcing a child with severe metabolic dysfunction into high-anxiety aerobic tracking often triggers acute physiological stress, driving up cortisol levels and paradoxically exacerbating the very endocrine imbalances the exercise was intended to resolve.

Children with high body mass index (BMI) typically present with specific structural challenges, including a weakened musculoskeletal framework, diminished baseline physical capacity, and a body composition heavily skewed toward fat mass. Forcing these children into aggressive aerobic routines frequently induces acute muscle soreness, joint injuries, and performance anxiety, driving them to completely

halt exercise habits due to prior negative experiences and a degraded sense of physical self-efficacy.

Pediatric populations struggling with severe weight challenges frequently present with premature orthopedic vulnerabilities, such as accelerated cartilage wear, structural joint misalignments, and chronic lower back strain. Forcing these structurally compromised frameworks into heavy aerobic tracking models not only compounds performance anxiety but severely elevates the risk of musculoskeletal injury. Shifting the clinical focus toward early-stage functional conditioning, stability training, and localized resistance exercises addresses these biomechanical risks preemptively. By anchoring movement in a safe, controlled environment, the clinician protects fragile pediatric joint structures while systematically rebuilding physical self-efficacy, converting physical activity from a punitive chore into a safe and empowering baseline habit.

To break this cycle, the proposed framework advocates for an efficiency-driven paradigm shift, adapting core principles to pediatric care. This approach consciously replaces aggressive aerobic dominance with a low-to-moderate intensity, highly structured training model that prioritizes functional balance, core stability, and gradual progressive overload. More importantly, prioritizing resistance and core stability safely builds skeletal muscle tissue, which acts as the body's primary metabolic sink for glucose. This functional adaptation directly combats insulin resistance, creating the favorable hormonal profile required for healthy pubertal development and future reproductive function.

Rapid weight loss or shifting body dynamics in growing children fundamentally alter the body's homeostatic equilibrium and neuro-physical function; the skeletal muscles responsible for supporting posture must adapt to shifting mass centers, a biological process that occurs slowly and requires deliberate center-of-gravity and neural conditioning. By implementing targeted exercises such as single-leg stability stands, stability ball alignments, reverse crunches, upper crunches, mountain climbers, and progressive resistance band exercises 2 to 3 times per week, the framework systematically strengthens the deep abdominal and dorsal

musculature, enhances core posture, and optimizes proprioception. Balance training is vital in promoting functional mobility, improving neuro-physical function, and reducing the risk of falls (Guardia et al., 2013).

Crucially, this functional training modality yields profound psychological and metabolic benefits alongside its musculoskeletal outcomes. Because this functional framework focuses on minimizing time investment while maximizing neural and muscular stimulation via precise, controlled movements, it completely eliminates the exhausting, anxiety-inducing environments of public aerobic tracking. Setting small, highly achievable physical goals within a safe, instructor-led, or family-supported environment directly strengthens the child's physical confidence and reinforces internal motivation. By eliminating the cortisol spikes associated with aerobic performance anxiety, this functional framework provides the consistent, low-stress mechanical stimulus required to secure long-term metabolic recovery and protect the child's reproductive future.

6. CLINICAL IMPLICATIONS AND COMPARATIVE DISCUSSION

The theoretical and empirical synthesis presented in this framework carries profound, immediate implications for modern clinical guidelines, public healthcare delivery, and pediatric policy design. For too long, the medical and commercial mainstream has operated under the reductive assumption that childhood obesity—and its severe endocrine-metabolic consequences—can be managed via automated digital interfaces that outsource the therapeutic relationship to screens, tracking algorithms, and remote data collection. While these digital tools offer convenient data metrics, they are structurally unequipped to address the complex psychological underpinnings of obesity, such as trauma from peer bullying (Puhl et al., 2020), emotional eating loops driven by specific personality profiles (DeYoung, 2010), or the systemic friction generated within an unaligned family household (King et al., 2022). Because these detached digital tools fail to resolve the underlying behavioral triggers, they ultimately fail to secure the long-term nutritional adherence required to correct metabolic programming.

The clinical model advocated here forces a return to a deeply integrated, human-centric triad that measures intervention success not merely by immediate body mass index (BMI) reduction, but by the long-term stability of the child's endocrine system, the preservation of their future reproductive health, and the psychological health of their immediate relational ecosystem. The human-centric triad framework relies on direct clinical connection and relational counseling. The traditional approach frequently treats the child as an isolated user, omitting localized cultural contexts such as family hosting traditions and dietary environment friction (Keinan-Boker et al., 2005). Conversely, the proposed framework establishes the household as a unified team (Lent et al., 2016) and introduces direct psychological profiling using the BariPA Model to shape personalized cognitive-behavioral therapy (Hjelmesæth et al., 2018). Setbacks are managed through therapeutic reframing rather than punitive digital logs (Phelan et al., 2022), and physical conditioning centers on core stability, safe functional balance, and progressive movement rather than stress-inducing caloric burn metrics (Guardia et al., 2013).

The implementation of this framework requires multidisciplinary healthcare teams—including pediatricians, pediatric endocrinologists, clinical dietitians, exercise physiologists, and mental health professionals—to completely reconstruct standard intake and follow-up protocols (Di Lorenzo et al., 2020). Prior to the issuance of any clinical nutrition guidelines, a comprehensive psychological profile of the child's personality traits (DeYoung, 2010) and a thorough diagnostic interview regarding childhood bullying experiences must be executed (Puhl et al., 2020). Simultaneously, the family unit must be formally locked into the treatment architecture through mandatory parental psychoeducation sessions designed to prepare the household for the inevitable systemic stress and shifts in domestic power dynamics that accompany lifestyle redirection (King et al., 2022).

By shifting public health policy funding away from detached digital platforms and redirecting resources toward structured, human-mediated, and family-centered clinical infrastructure, society can finally provide young populations with the deep emotional security and relational scaffolding necessary. This robust scaffolding is not

merely a psychological luxury; it is the essential clinical mechanism for achieving the sustainable nutritional behavior needed to optimize endocrine-metabolic programming and safeguard the future reproductive health of the next generation.

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THE IMPACT OF INFORMATION NOISE ON HUMAN DAILY LIFE

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Abstract. *In modern society, information noise has become an integral part of today's human life. The real state, when information flows become more accessible, when a person constantly receives a considerable amount of various news, fake news, spam, advertising, gossip, e-mails, messages on social networks of various content, different directions, where their information flow does not end, but on the contrary is continuously updated, and how it is important to filter what actually has real meaning. The importance of paying attention to awareness is increasing, how to concentrate in the case when it is necessary to reduce anxiety from information flow overload, information manipulations, so that a person is able to control and analyze the current situation at the moment. Such approaches become a mechanism for influencing human consciousness to avoid information noise as much as possible and maintain emotional balance in the real conditions of today.*

In the scientific community, many foreign and domestic scientists have recently been dealing with information noise issues, who from various directions research and analyze information noise, types of information noise, and eliminating symptoms of information overload.

The results of the study confirm that a person needs skills to personally protect himself from information noise, information manipulation, how to deal with the

existing root causes of information overload and prevent the consequences of information overload in the future.

It is obvious that the main effective source of the ability to reliably protect people from the negative impact of information noise is the regulatory and managerial role of state bodies, which have numerous response capabilities in their arsenal, including administrative, financial, economic, political, etc. Improving and streamlining the activities of such bodies will provide significant priorities in the future in promptly and effectively overcoming the consequences of the impact of negative information noise.

Keywords: *information noise, information flows, information space, information society, information overload, information manipulation.*

Problem Statement. Today, there is no doubt that the modern world is oversaturated with information. First of all, the excessive flow of data, information noise, is determined by the presence of unimportant or secondary information in its composition [1].

This includes information containing data (statements, photos, videos, etc.) about strangers on social networks, a large layer of various news located on numerous sites and entertainment channels, etc. In other words, this information does not meet the needs of a particular person in terms of its content, but is present in his surrounding information space of everyday life and requires appropriate attention and a certain amount of time to determine the degree of "usefulness" in solving the issue under consideration.

Analysis of Recent Research and Publication. Many foreign and domestic scientists paid significant attention to the study and consideration of this topic in their scientific research.

The issues of information noise were addressed by such domestic scientists as: O. Zolotar (2012) studied the phenomenon called "Information noise" in the conditions of the formation of an information society. M. Ostroha (2023), A. Yurchenko (2023), A. Korovai (2023) substantiated the problem of identifying

information noise for an ordinary person through the prism of the need to observe information hygiene. V. Voronka (2014) studied the manifestations of information noise as a specific communication barrier in reference publications. O. Lysenko (2025) and D. Rozhkov (2025) investigated the identification of philosophical and political features of the functioning of freedom of speech in conditions of information noise. L. Chuprina (2014) considered the problems of information noise when using operational Internet information for the preparation of information and analytical materials, etc.

These materials offer a vision of information noise, symptoms of information overload and how to deal with it.

Purpose and Objectives of the Article. The purpose of this article is to study the impact of information noise and the elimination of symptoms of overload on human consciousness. By analyzing the conditions of a particular person's daily life, it is possible to determine the level of impact of information noise on their consciousness, as well as the signs of information overload and how to prevent negative consequences.

Main Text. In today's environment, the topic of information noise is quite relevant. It should be noted that a type of information noise is information noise, a deliberate overload of the listener with insignificant, unimportant information in order to distract attention from reliable data. At the same time, subspecies of information noise are various fake messages, scary news, yellow press, spam, gossip, obscure shows, all kinds of propaganda advertising, etc [2].

That is, regardless of the content of new information (negative, positive, etc.) that a person receives, it always carries a corresponding "load" on his brain. Thus, the human brain, by its physiological properties, tries to study the surrounding situation, determine (review) ways to solve the issue in essence, or simply has the functions of memorizing information, including visual ones. All this requires significant stress from him, which over a long period of time can lead to fatigue or mental exhaustion of a person.

Undoubtedly, an excess of unnecessary, distorted, or intrusive information overloads and confuses the perception of what is actually important, valuable news [3].

Along with this, the following noise factors can be distinguished that affect the volume of information distribution and use:

- physical (caused by the presence of negative reasons that contribute to the obstruction of the flow of information);

- semantic (arise in case of misunderstanding of the received information by the user);

- pragmatic (are created in case of receipt of significant volumes of unnecessary information for its consumer) [4].

There is no doubt that to ensure the proper functioning of the information and management process, only the information that outlines its real state is needed. At the same time, everything that is superfluous belongs to the category of information noise.

In this context, it is necessary to note the negative role of information barriers, which, first of all, are caused by the presence of objective and subjective factors aimed at threatening the proper dissemination, receipt and use of information.

In turn, information barriers are divided into the following types:

- historical (have signs of temporal remoteness of past historical facts and events, which affects the veracity of the receipt of information about them);

- geographical (are caused by the presence of significant remoteness of the source of information from its recipient);

- departmental (are introduced according to separate rules for the use of their own information, created in separate institutions, institutions, etc.);

- qualification (depend directly on the level of preparation of the recipient of information);

- language (arise in the case of a language variant between the source of information and its user);

- regime (are created to prevent the undesirable influence of information);

- economic (are based on the presence of problems related to the possibility of proper financial and economic provision of the user of information with a high-quality source of its receipt);

- psychological (associated with the personal attitude to the content of the information on the part of its user);

- terminological (depend on the level of evaluation of terms that are similar in meaning) [Right there].

Thus, having considered the conditions of daily life of a certain person, it is possible to formulate the degree of influence of information noise on his consciousness, namely by the following indicators of information overload:

- a person receives, studies and consumes a large amount of information, being constantly online to receive it;

- the emergence of signs of a lack of concentration of the person's attention to solving important issues that he is studying, considering or worrying about;

- a person began to pay more attention to links that do not have useful information content for him;

- a person began to have certain disorders with sleep, fatigue and nervous disorders (irritability, apathy, etc.) in everyday life;

- useful information for a person does not arouse interest in his consideration [5].

It is obvious that information overload is dangerous for a person, and it is necessary to try to combat the emergence of causes and problems of information overload in order to avoid information overload in the future and practice managing one's own verified use of information. Behavior in the information space is especially important, where first of all a person must think, reflect, and then engage in searching and analyzing the information received [6].

Therefore, in order to eliminate the symptoms of information overload, a person needs to pay attention to the following recommendations: focus on the reasons that influence the distraction from solving the problem that worries him; limit or exclude from a person's life the possibility of receiving unnecessary

information that comes with the help of technical means (mobile communication, the Internet, television, etc.); determine the list of applications that need to be left to ensure the person's daily use; delete applications that will continue to receive various notifications that are unnecessary for the person; create a separate list of things that directly affect the reduction in the level of personal attention; exclude the possibility of receiving unnecessary notifications that will come via communication means, including a mobile phone; conduct an "audit" of the applications that are used in order to remove unnecessary ones; find an opportunity to stay in a state of peace, mental balance and meditation for some time; introduce a rule to prevent the use of mobile communication devices a few hours before bedtime and during meals; gain personal experience aimed at the ability to apply methods for "screening out" unnecessary information at the subconscious level, the ability to "filter" it; it is necessary to concentrate on the main, leading aspects, such as determining your information priorities, it is important not only to receive the necessary, appropriate information, but also to know how to process it in order to avoid information overload. [7].

Considering the latest research conducted by the NGO "Detector Media" to find out the level of people's ability to properly perceive information, conduct its detailed analysis for the purpose of further generalization and interpretation of the results of the received content, how it uses numerous sources of information, it is noted: recently, society has become more experienced in analyzing any information, researchers say. This has been observed for the last four years. The part of the Ukrainian population that notices disinformation by looking for a link to the source in the material is 44% (in 2021 it was 30%), focuses on video / photo confirmation ¬ 37% (22% in 2021), on the presentation of different points of view in the material ¬ 31% (27% in 2021).

The importance of the problem of disinformation is emphasized by 55% of the audience (compared to 62% in 2024 – a statistically significant difference). 19% noted that they can always recognize fakes and not notice them. The share of Ukrainians who check information for accuracy is 44%. This data has remained at

the same level as last year (42%). The other part of people who do not check information for accuracy has noticeably decreased from 37% to 30% [8].

Conclusions and perspectives of further development. Thus, it takes some time for a person to acquire the necessary skills for their personal protection from information noise. At the same time, special attention should be paid to the fact that information noise does not carry any useful information and is not subject to its appropriate consideration and processing. Acquiring such skills will be useful for every person in their everyday information life.

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STRATEGIC DUE DILIGENCE AS A TOOL FOR ASSESSING SME INTERNATIONAL MARKET ENTRY PROFITABILITY

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Abstract. *International expansion is an important growth path for small and medium-sized enterprises (SMEs), but it is exposed to uncertainty, incomplete information and the risk of overestimating viability. This paper proposes Strategic Due Diligence (SDD) as a conceptual decision-support tool for assessing SME foreign-market entry before resources are committed. The study is based on a structured review of articles and institutional reports from 2010-2026, complemented by expert reflection from due diligence, valuation and strategic advisory practice. The paper develops the SDD-5M model, covering five dimensions: market, competitive, regulatory-legal, financial-operational and cultural-institutional. The model explains how information asymmetry and optimism bias may distort revenue forecasts, margin assumptions, costs, compliance burdens, working-capital needs and the discount rate used in appraisal. Its theoretical contribution links SME internationalisation theory, information economics, prospect theory, transaction-cost reasoning and value-based management. Its practical contribution shows how strategic findings can inform DCF parameters, including sales volumes, EBITDA margins, CAPEX/OPEX and risk premia. SDD-5M is not an automatic valuation algorithm, but a heuristic framework supporting evidence-based entry decisions. The article defines its boundary conditions: it is most useful for SMEs entering their first*

or second foreign market through export, distribution, branch or joint venture. Applicability is more limited in microfirms, born-global firms and highly regulated sectors. The study concludes that SDD may reduce overestimation of market attractiveness and underestimation of adaptation costs, improving strategic and financial decisions in SME internationalisation. It also highlights the need to combine secondary-data analysis, selective interviews, legal verification and scenario testing so that managers can compare entry modes, adjust expansion scale and partner choice before scarce resources are committed.

Keywords: *strategic due diligence; SME internationalisation; information asymmetry; optimism bias; enterprise valuation; value-based management.*

Introduction. The international expansion of small and medium-sized enterprises is among the most demanding strategic decisions made under conditions of limited resources, high uncertainty and incomplete information. The European Commission defines SMEs as enterprises with fewer than 250 employees and turnover not exceeding EUR 50 million [7]. Although this sector generates more than half of European value added, only around one quarter of European SMEs engage in export activity [8], and some firms withdraw from foreign markets shortly after entry [23].

This study argues that one important reason for the limited sustainability of SME international expansion is a distorted assessment of economic viability. Information asymmetry and optimism bias may cause market, competitive, regulatory and operational risks to be insufficiently reflected in cash-flow projections or in the discount rate. Although strategic due diligence (SDD) is well established in mergers and acquisitions practice [9], its use as an autonomous tool for assessing SME foreign-market entry remains underdeveloped in management research [4].

The aim of the study is to explain how information asymmetry and optimism bias distort the assessment of SME expansion viability, to propose the conceptual SDD-5M model, to define its conditions of applicability and to show how its findings may inform selected parameters of financial appraisal. Four research questions are

addressed: what dimensions should an SME-oriented SDD model include; how do information asymmetry and optimism bias lead to valuation errors; under what boundary conditions is SDD-5M justified; and how can its findings be translated into valuation parameters?

The contribution of the study is theoretical and conceptual. It integrates information asymmetry and optimism bias into one explanatory framework for SME expansion-valuation errors, proposes the SDD-5M model as a five-dimensional decision-support framework, links SDD findings with financial appraisal and specifies the model's boundary conditions.

1. Methodology and epistemological status

This study is theoretical and conceptual. It is based on a structured, problem-oriented literature review, complemented by expert reflection derived from practical experience in due diligence, business valuation and strategic advisory work for SMEs. Its purpose is not to test statistical relationships, but to structure the mechanisms that may lead to erroneous assessments of international expansion profitability and to propose an analytical framework for interpreting them.

The review was conducted in Scopus, Web of Science and Google Scholar for publications from 2010 to 2026. Classic works relevant to information asymmetry, prospect theory, internationalisation and transaction costs were also included. Sources were selected according to their relevance for explaining erroneous profitability assessments in SME international expansion and for constructing the SDD-5M model.

The analysis covered publications concerning at least one of three areas: SME internationalisation and entry barriers; strategic due diligence and risk analysis; and financial appraisal of expansion projects and value-based management. After duplicate removal and assessment of titles, abstracts and full texts, 57 peer-reviewed articles and 14 institutional reports were included, supplemented by 9 seminal works identified through citation tracking. In total, 80 items were analysed.

The construction of the SDD-5M model was sequential. First, the SME internationalisation literature was used to identify uncertainty areas accompanying

foreign-market entry. Second, due diligence literature supplied the diagnostic logic of ex ante risk identification. Third, value-based management and financial appraisal were incorporated to show how information asymmetry affects cash-flow projections, cost structures and discount rates [35]. The proposed model is therefore a conceptual and heuristic tool rather than an empirically validated measurement instrument.

2. Information asymmetry, optimism bias and SDD in internationalisation theory

Information asymmetry between an SME and the target market, well described in information economics [1; 30], and optimism bias, as conceptualised within prospect theory [16], constitute two coexisting sources of erroneous assessment of international expansion. Acting jointly, they may lead to systematic overstatement of the NPV of expansion projects: underestimated risks are inadequately reflected either in revenue projections or in the discount rate.

The distortion operates across the five dimensions of SDD-5M. At the market level, an incorrect assessment of TAM/SAM and distribution channels inflates revenue projections. At the competitive level, underestimating competitor reactions inflates margins. At the regulatory-legal level, omitted compliance costs understate entry costs. At the financial-operational level, incorrect cost structures and cash-flow assumptions distort the DCF model. At the cultural-institutional level, underestimated cultural distance lowers the risk premium in the discount rate.

This mechanism is consistent with major theories of internationalisation. The Uppsala model describes internationalisation as a sequential knowledge-development process in which uncertainty declines with experience [13; 14]. Its later version stresses liability of outsidership, understood as the constraint arising from weak embeddedness in local business and institutional networks [14]. Transaction Cost Theory justifies SDD as an investment in reducing ex ante transaction costs [3; 36]. Dunning's OLI paradigm is reflected in the model structure: market and competitive dimensions address location advantages, financial-operational and regulatory-legal dimensions address ownership advantages, and the cultural-institutional dimension addresses internalisation conditions [6].

Compared with corporate due diligence, SDD for SMEs differs in scope, data access and decision logic. Corporate due diligence relies on extensive documentation and specialised expert teams, whereas SME-oriented SDD must operate with limited resources, public data, selective interviews and a gradual entry logic. Its key distinction is project-level assessment under SME resource constraints [9; 10; 38].

3. Barriers to SME internationalisation as sources of information asymmetry

Research on export barriers confirms that SME internationalisation is constrained by a broad set of internal and external obstacles. Kahiya identifies 50 types of export barriers in five decades of research [15], while Leonidou distinguishes internal and external barriers hindering small-business export development [20]. Child, Karmowska and Shenkar emphasise that institutional and cultural context remains insufficiently integrated into explanations of SME internationalisation [4].

From the perspective of expansion valuation, three categories of barriers are particularly important. Information-asymmetry barriers generate errors at the market and competitive levels. Regulatory-legal barriers lead to understatement of entry and compliance costs. Cultural-institutional barriers may understate the risk premium in the discount rate; empirical work shows that cultural distance increases the risk of market exit [2]. When these barriers interact with optimism bias, firms may systematically overestimate market attractiveness and underestimate adaptation costs.

4. The SDD-5M model: dimensions, indicators and decision implications

The SDD-5M model operationalises the mechanism through which information asymmetry and optimism bias distort the assessment of international expansion profitability. Its purpose is not merely to list risk factors, but to structure their analysis so that the results can be used in the economic appraisal of an expansion project.

The model identifies five areas corresponding to distinct levels of information asymmetry: market, competitive, regulatory-legal, financial-operational and cultural-institutional. Each dimension is linked to theoretical traditions and to a specific source of valuation distortion. Table 1 summarises the literature-model synthesis.

Table 1. Literature-model synthesis map for SDD-5M

Dimension	Key sources	Source of valuation distortion	Theoretical tradition
Market	Johanson/Vahlne; Kahiya; Leonidou	Overstated revenue projection	Uppsala model; industrial organisation
Competitive	Porter; Teece et al.	Overstated margins and underestimated reactions	Five forces; dynamic capabilities
Regulatory-legal	Barkema et al.; Kostova	Understated entry and compliance costs	Institutional theory
Financial-operational	Copeland et al.; Rappaport; Węgrzyn	Incorrect discount rate and cash-flow assumptions	VBM; transaction-cost economics
Cultural-institutional	Hofstede; GLOBE; Shenkar	Understated cultural-risk premium	Cultural distance; institutional theory

Source: Authors' own elaboration based on a structured literature review and synthesis of internationalisation theory, due diligence, value-based management and institutional-cultural determinants.

The market dimension concerns the scale and accessibility of demand in the target market. Key indicators include TAM/SAM, market growth, saturation, distribution-channel structure, distributor margins and access barriers. Low market accessibility or entry barriers exceeding the SME's resources may justify discontinuing further analysis or changing the entry mode.

The competitive dimension addresses the actual intensity of competitive pressure and its impact on achievable margins. It moves beyond static sector analysis towards dynamic competitive intelligence. Indicators include market shares of leading competitors, cost position, historical reactions to new entrants and price comparison at full entry cost [25; 31]. If a sustainable price-, quality- or relationship-based advantage cannot be built, sales and margin assumptions should be revised.

The regulatory-legal dimension identifies risks that may prevent or significantly delay implementation regardless of market attractiveness. Indicators include compliance costs, certification time, tax and contractual risks, and indicators

of institutional quality such as the World Bank's Worldwide Governance Indicators and Transparency International's Corruption Perceptions Index [32; 37].

The financial-operational dimension is the integration point of the model because it translates identified risks into appraisal parameters. It covers break-even analysis, liquidity capacity, scenario analysis, cash-flow sensitivity, working-capital requirements and, where debt financing is used, debt-service capacity [35].

The cultural-institutional dimension captures risks arising from cultural differences, institutional quality and business-environment predictability. It incorporates Hofstede's cultural dimensions, the GLOBE study, Shenkar's concept of psychic distance and Kostova's institutional perspective [11; 12; 18; 28]. These factors may affect adaptation costs, contract enforcement and the risk premium used in valuation. Table 2 presents the model's core indicators and decision implications.

Table 2. SDD-5M model - indicators and indicative decision-making implications

Dimension	**Key indicators**	**Decision-making implication**	**RQ**
Market	TAM/SAM; market growth; channel access; distribution structure	Low accessibility or weak demand may justify abandoning the market or changing the entry mode	RQ1, RQ2
Competitive	Leader shares; margins; competitor reactions; price and quality comparison	Weak competitive advantage may require revision of sales and margin assumptions	RQ1, RQ2
Regulatory-legal	Compliance requirements; adjustment time and cost; regulatory and tax risk	High burdens may justify postponement, a different partner or another form of presence	RQ1, RQ3
Financial-operational	Cash flows; working capital; liquidity capacity; scenarios	Low resilience may indicate the need to reduce scale or abandon the project	RQ1, RQ4
Cultural-institutional	Cultural distance; institutional quality; contract enforcement	High distance may support indirect entry, local partnership or additional safeguards	RQ1, RQ3

Source: Authors' own elaboration based on the structured literature review and the sequential logic of constructing the SDD-5M model.

5. Operationalisation, valuation integration and scope of applicability

The practical value of SDD-5M lies in translating strategic findings into financial-appraisal assumptions. The model does not replace DCF analysis, but provides structured evidence for verifying revenue, margin, entry-cost, working-capital and risk-premium assumptions. Table 3 presents an indicative translation scheme.

Table 3. Directions for translating SDD-5M results into valuation parameters

Dimension	Valuation distortion	Valuation parameter	Direction of correction
Market	Overstated revenues	Sales volume in the base DCF scenario	Downward correction when channel barriers or low TAM are identified
Competitive	Overstated margins	EBITDA margin and prices	Downward correction under strong competition
Regulatory-legal	Understated entry costs	CAPEX/OPEX; compliance costs	Upward cost correction and lower NPV
Financial-operational	Incorrect cash flows and discount rate	WACC; working capital; liquidity risk	Expert verification of assumptions
Cultural-institutional	Understated risk premium	Market-risk premium	Possible expert adjustment of the discount rate

Source: Authors' own elaboration based on the conceptual logic of translating SDD-5M findings into valuation parameters.

The discount rate used in the DCF model includes the base cost of equity estimated through the build-up approach, which adds the risk-free rate and risk premiums: market, size, industry and project-specific premiums. In non-listed SMEs, additional adjustments may be needed for limited liquidity, low diversification and greater operational sensitivity [35]. SDD-5M should therefore be treated as a structured basis for expert calibration rather than an automatic algorithm for determining the discount rate.

The model's effect may be illustrated by a hypothetical manufacturing SME planning market entry through a local distributor. Before SDD-5M, the firm assumes annual revenues from year 2 of PLN 8 million, an EBITDA margin of 14%, entry expenditure of PLN 2.5 million, a five-year horizon and a discount rate of 9%, giving

an NPV of approximately PLN 1.2 million. After applying SDD-5M, projected revenues are reduced by 15%, the EBITDA margin falls to 10%, compliance and documentation costs increase entry expenditure by PLN 0.6 million, and the discount rate is adjusted to 11%. The project becomes only marginally profitable.

Table 4. Illustrative impact of applying SDD-5M on international expansion appraisal

Parameter	**Initial assessment**	**Assessment after SDD-5M**
Annual revenue from year 2	PLN 8.0 million	PLN 6.8 million
EBITDA margin	14%	10%
Entry expenditure	PLN 2.5 million	PLN 3.1 million
Discount rate	9%	11%
Project NPV	approx. PLN 1.2 million	approx. 0 / slightly negative

Source: Authors' own elaboration. Hypothetical data, for illustrative purposes only.

The implementation of SDD-5M may follow a three-phase funnel: secondary-data analysis, primary verification through interviews and legal analysis, and final synthesis leading to an SDD report containing a map of information-asymmetry risks and a business rationale for the DCF model [5; 27; 29]. Entry-mode recommendations follow from the synthetic assessment of model results: high attractiveness and low regulatory distance may support direct entry; moderate attractiveness with regulatory risk may support joint venture or licensing; weak certainty or high distance may support test export through a distributor [6; 14; 38].

The model is not universal. It is best suited to SMEs entering their first or second foreign market through export, distribution, a branch or joint venture. Its application is more limited in microfirms, born-global firms with developed networks and sectors subject to mandatory government concessions. Table 5 specifies the main boundary conditions.

Table 5. Scope of applicability of the SDD-5M model

Boundary dimension	**Optimal application**	**Limited applicability**	**Outside the scope**
Firm size	SMEs: 10-249 employees, turnover EUR 2-50 million	Microfirms - simplified version	Multinational corporations
Stage of internationalisation	First or second foreign market; test export or branch	Firms in more than five markets - rapid screening	Born-global firms with developed networks
Industry	Manufacturing, professional services and technologies	E-commerce - simplified regulatory dimension	Industries requiring mandatory government concessions
Geographical direction	EU, Central and Eastern Europe, DACH, United Kingdom	Emerging markets - deeper Phase II required	Markets without reliable data or legal support
Entry mode	Export, distribution, branch, joint venture	Greenfield FDI - requires technical due diligence	Acquisitions - require full corporate M&A due diligence

Source: Authors' own elaboration based on the structured literature review and the sequential logic of constructing the SDD-5M model.

6. Conclusions, implications and research perspectives

The answers to the research questions can be summarised as follows. First, an SME-oriented SDD model should include five dimensions: market, competitive, regulatory-legal, financial-operational and cultural-institutional. Each dimension refers to a separate level of information asymmetry and has specific decision implications. Second, information asymmetry and optimism bias may jointly lead to the systematic overstatement of the NPV of international expansion projects because market risks are not sufficiently reflected in revenues or discount rates.

Third, the model is applicable primarily to SMEs with limited but real analytical capacity, especially those entering their first or second foreign market. Fourth, SDD-5M findings may be translated into valuation parameters by correcting

sales volumes, margins, entry costs, working-capital assumptions and the risk premium. These corrections remain expert-based and require project-specific judgement.

The study contributes to the literature in three ways. It connects information asymmetry theory and prospect theory with SME internationalisation decisions in a framework explaining expansion-valuation errors. It proposes the SDD-5M model as a conceptual decision-support framework. It also links due diligence findings with value-based management and financial appraisal, particularly DCF assumptions.

The model has limitations. It has not yet been empirically validated; it assumes access to secondary data and basic market analysis; it may require adaptation in highly regulated industries and politically risky markets; and its criteria are indicative rather than universal thresholds. SDD-5M does not eliminate uncertainty, but it may reduce the risk of misjudging it.

The practical implication is that SMEs should not enter foreign markets solely on the basis of expected sales potential. They should first examine market accessibility, competitive pressure, regulatory burdens, financial resilience and cultural-institutional risk. Further research should empirically test the model across industries, geographic directions and entry modes, and examine whether it improves the accuracy of financial assumptions and reduces suboptimal expansion decisions.

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HOTEL INVESTMENTS AS INSTRUMENTS FOR MANAGING URBAN REVITALISATION: THE CASE OF GRIMM'S HOTEL AM POTSDAMER PLATZ

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Abstract. *The article examines hotel investments as instruments for managing urban revitalisation. The point of departure is the observation that hotels are usually analysed as tourism infrastructure or as market responses to visitor demand, while their urban role in shaping public space, local service ecosystems, everyday mobility and governance remains underexplored. The aim is to identify the conditions under which a hotel investment may become an effective instrument for the revitalisation of neglected urban areas rather than merely a commercial project benefiting from an improving location. The article draws on a theoretical-conceptual synthesis and multiple-case-study logic developed in doctoral research on German urban contexts: HafenCity Hamburg, Dresden Neumarkt and Taschenbergpalais, Hotel Adlon in Berlin and Grimm's Hotel am Potsdamer Platz. The main focus is Grimm's Hotel at Flottwellstraße 45, interpreted as a consolidating investment in the mature phase of the Potsdamer Platz transformation. The paper proposes a multidimensional framework for assessing spatial, economic, social, institutional and environmental*

effects and identifies six mechanisms of hotel-led revitalisation: demand generation, local value-chain and clustering effects, institutional signalling, spatial activation, symbolic re-framing and the generation of external risks. The findings show that hotel investments may support urban revitalisation only conditionally, depending on spatial integration, local embeddedness, active ground-floor interfaces, governance capacity, environmental responsibility and safeguards against gentrification and touristification. The article also formulates practical criteria for cities and investors to evaluate hotel projects before implementation and to monitor their effects after opening.

Keywords: *urban revitalisation; hotel industry; local development; Grimm's Hotel; Potsdamer Platz; urban governance; tourism and urban regeneration; local value chains.*

Introduction. The revitalisation of neglected urban areas is one of the central challenges of contemporary urban policy. European cities face the long-term consequences of deindustrialisation, suburbanisation, demographic decline, depreciation of historical building stock and the functional weakening of inner-city districts. Revitalisation is therefore no longer understood as the simple renovation of buildings, but as a multidimensional transformation involving spatial, social, economic, cultural, environmental and institutional change [16; 17]. In this context, private service investments, including hotels, increasingly participate in the restructuring of urban space.

The role of the hotel industry in revitalisation processes remains theoretically underdeveloped. In much of the literature, hotel investments are treated primarily as tourism infrastructure or as market responses to growing visitor demand. Less attention is paid to their capacity to influence local development, activate streets, stabilise user flows, support complementary services and become part of governance arrangements in revitalised areas. This gap is important in cities where public resources for regeneration are limited and private investment becomes a practical instrument of urban transformation [1; 15].

The research problem addressed in this article is the following: under what conditions can a hotel investment function as a genuine instrument for revitalising a neglected urban area, rather than as a commercial project that merely benefits from an improved location? The article advances a conditional thesis: hotel investments may support urban revitalisation if they are functionally and spatially integrated with their surroundings and embedded in a coherent governance model. Thus, it rejects the promotional assumption that every hotel automatically generates revitalisation benefits. The urban value of a hotel depends on local value chains, spatial interfaces, institutional coordination, operational responsibility and mechanisms limiting external costs such as gentrification, touristification and functional homogenisation [2; 7; 19].

The aim of the article is to identify the mechanisms through which hotel investments influence urban revitalisation and to formulate criteria for assessing when these mechanisms produce durable and inclusive effects. The main case is Grimm's Hotel am Potsdamer Platz, located at Flottwellstraße 45 in Berlin. The case is interpreted in a comparative perspective, with reference to HafenCity Hamburg, Dresden Neumarkt and Hotel Adlon in Berlin.

1. Literature background and research gap

Urban revitalisation is commonly defined as an integrated process aimed at moving degraded areas out of crisis through coordinated spatial, social, economic and environmental interventions [4; 16; 24; 27]. European approaches emphasise sustainable urban development, social inclusion and the protection of historical urban landscapes [17; 22]. In the German context, revitalisation is also linked with the reintegration of fragmented urban structures and the reconstruction of centrality after periods of industrial decline, war destruction or political rupture [14; 23; 28].

The literature on urban tourism and hospitality highlights the economic role of hotels in generating visitor expenditure, jobs and demand for complementary services [3; 12; 15]. However, the dominant hospitality perspective is often firm-centred: it focuses on occupancy, revenue, market segmentation and service quality. Conversely, urban studies usually examine regeneration through public policy, planning, housing,

social justice or cultural heritage, while treating hotels as only one of many commercial land uses. The result is a fragmented field in which hotels are rarely conceptualised as urban actors.

This article identifies four main research gaps. First, there is a lack of an integrated analytical framework linking the spatial, economic, social, institutional and environmental effects of hotel investments. Second, existing studies tend to privilege flagship or luxury developments, while smaller consolidating hotels in mature revitalisation areas remain under-analysed. Third, the spatial effects of hotels, such as the quality of ground floors, pedestrian continuity and interfaces with public space, are less often operationalised than financial indicators. Fourth, the role of the manager-researcher, who has access to operational knowledge of a hotel embedded in a revitalised district, remains methodologically underused, although it may reveal tacit mechanisms unavailable in purely external studies.

The article responds to these gaps by treating the hotel not merely as an accommodation facility, but as a node in an urban system. A hotel may distribute visitor demand, support local services, activate pedestrian routes, shape the image of a district and signal investment confidence. At the same time, it may contribute to displacement or the privatisation of public benefits if it is poorly integrated with planning and social safeguards. Management literature is relevant here because revitalisation areas are characterised by uncertainty, institutional fragmentation and the need to coordinate multiple actors. In this respect, the management of hotel investments in sensitive urban environments may be interpreted through the lens of strategic flexibility, early diagnosis and adaptive response [20; 21].

2. Methodology and research design

The article is based on a theoretical-conceptual and case-study approach. It draws on selected findings from a doctoral thesis on the role of the hotel industry in managing the revitalisation of neglected urban areas. The methodological foundation is an interpretative-pragmatic paradigm, combining sensitivity to context with an orientation towards practical recommendations for urban governance. Such an

approach is appropriate where the aim is not statistical generalisation, but analytical generalisation concerning mechanisms and boundary conditions [8; 9; 10; 18].

The research strategy is a multiple case study. The cases were selected purposively rather than randomly. Their value lies in typological diversity and a common institutional context. HafenCity Hamburg represents a megaproject and mixed-use waterfront transformation; Dresden Neumarkt and Taschenbergpalais represent heritage-led regeneration; Hotel Adlon Berlin illustrates the reconstruction of a symbolic urban landmark; Grimm's Hotel am Potsdamer Platz represents a consolidating hotel investment in the mature phase of urban transformation. The unit of analysis is not the hotel as a building, but the hotel in relation to the surrounding spatial, economic and institutional system.

Table 1. Research design and analytical operationalisation

Element	Specification in the article	Analytical function
Research problem	Conditions under which a hotel investment becomes an instrument of revitalisation rather than only a commercial project.	Defines the central explanatory question.
Research strategy	Multiple case study: HafenCity, Dresden Neumarkt/Taschenbergpalais, Hotel Adlon, Grimm's Hotel.	Enables comparison of different revitalisation contexts.
Main case	Grimm's Hotel am Potsdamer Platz, Flottwellstraße 45, Berlin.	Illustrates a consolidating hotel investment in a mature transformation area.
Analytical dimensions	Spatial, economic, social, institutional and environmental dimensions.	Provides a framework for assessing hotel-city relations.
Type of inference	Analytical generalisation based on mechanisms and boundary conditions.	Avoids unsupported statistical claims and supports theory building.

Source: Author's own elaboration based on the doctoral manuscript and verified literature sources.

The empirical material used in the doctoral research combined a literature review, document analysis, planning and contextual data, field observation, interpretation of selected hotel and tourism indicators, and operational knowledge related to the Grimm's Hotel case. Triangulation was used to separate publicly verifiable information, contextual interpretation and expert-practical insight. The article therefore does not claim to provide a full econometric assessment of hotel impacts. Rather, it reconstructs the mechanisms through which such impacts are generated and conditioned [5; 18].

The researcher's position as a hotel manager requires methodological reflexivity. Access to tacit knowledge may increase the depth of interpretation, but it may also generate interpretive bias. For this reason, the manager-researcher position is treated as a source of contextual insight rather than as a substitute for triangulation. Claims concerning the hotel's urban role are formulated as mechanism-based interpretations and related to comparative cases and the literature.

3. The hotel as an urban actor: analytical framework and mechanisms

The central conceptual assumption of the article is that a hotel in a revitalisation area should not be analysed only as an enterprise or a real-estate asset. It should also be understood as an urban actor. This does not imply that a hotel exercises public authority, but that it affects the city through repeated everyday interactions: arrivals and departures, employment, procurement, delivery logistics, ground-floor activity, lighting, visibility, branding and the relationship between private interiors and public space.

The proposed analytical framework consists of four core dimensions and one cross-cutting environmental dimension. The spatial dimension concerns the insertion of the hotel into the urban fabric, including pedestrian continuity, permeability of the frontage, relationship to public transport, ground-floor quality and perceived safety. The economic dimension concerns employment, procurement, visitor expenditure, multiplier effects and the influence on surrounding services. The social dimension concerns accessibility, conflicts between residents and visitors, the balance between everyday and tourist functions, and the risk of displacement. The institutional

dimension concerns planning obligations, monitoring, participation, negotiated public benefits and the ability of public authorities to prevent the enclosure of revitalisation gains. The environmental dimension concerns energy, water, logistics, waste, noise and links to green-blue infrastructure.

The usefulness of this framework lies in its capacity to connect different indicators without reducing hotel-led revitalisation to a single economic measure. A hotel may be profitable and yet weakly integrated with the city. Conversely, a medium-scale hotel may have moderate symbolic visibility but significant cumulative impact if it stabilises everyday use, supports local services and strengthens pedestrian continuity. This distinction is crucial for interpreting Grimm's Hotel am Potsdamer Platz.

Table 2. Dimensions for assessing hotel investments in revitalisation areas

Dimension	Main question	Selected indicators
Spatial	Does the hotel strengthen the public-space system and everyday urbanity?	Ground-floor activity, pedestrian continuity, permeability, lighting, access to public transport, relation to parks and cultural facilities.
Economic	Does the hotel create local development effects rather than only internal profitability?	Local employment, procurement, cooperation with SMEs, visitor spending, tax contribution, complementary services.
Social	Does the hotel limit exclusionary effects and support balanced use of the area?	Resident complaints, rent pressure, balance of services, accessibility, conflict between tourist and everyday functions.
Institutional	Is the hotel embedded in governance mechanisms capable of directing private value towards public benefit?	Planning agreements, monitoring, stakeholder coordination, participation mechanisms, value-capture instruments.
Environmental	Does the hotel reduce operational burdens and contribute to sustainable urban transformation?	Energy use, waste management, delivery logistics, noise, water use, green-blue infrastructure links.

Source: Author's own elaboration based on the doctoral manuscript and verified literature sources.

The article distinguishes six mechanisms of hotel-led revitalisation. The first is the demand mechanism: hotels generate tourist, event-related and business demand,

stabilising the intensity of use in areas that may previously have been underused [12; 15]. The second is the supply-chain and clustering mechanism: a hotel may stimulate restaurants, retail, transport, cultural services, maintenance, laundry and food supply. The third is institutional signalling: hotel investment may signal confidence in an area previously perceived as risky or peripheral. The fourth is spatial activation: hotels affect the city through entrances, façades, ground-floor uses, pedestrian routes, lighting and visibility [6; 11]. The fifth is the symbolic and narrative mechanism: hotels may refer to heritage, local identity, cultural memory or the broader image of a district. The sixth is the external-risk mechanism: hotels may contribute to rising rents, displacement, touristification and symbolic homogenisation if governance capacity is weak [2; 7; 19].

4. Grimm's Hotel am Potsdamer Platz in its urban context

Grimm's Hotel am Potsdamer Platz is located at Flottwellstraße 45 in Berlin [26]. In the logic of the doctoral research, the hotel does not initiate the transformation of the area. Instead, it enters a mature phase of change and performs a consolidating role: it fills a gap in the urban fabric, stabilises the intensity of use and connects the metropolitan functions of Potsdamer Platz with the green-blue resources of Park am Gleisdreieck and the Landwehrkanal corridor.

The hotel represents the three-star/three-star-plus urban segment. The case material indicates a gross floor area of approximately 4,500 m², 110 rooms including seven apartments, a restaurant, two conference rooms, and fitness and sauna facilities. The investment process covered the years 2012-2016, while the hotel began operating in July 2015, before the final completion of all project-related works. These parameters position the hotel not as a luxury icon, but as a functional urban accommodation facility combining leisure, business and event-related demand.

The spatial value of the case lies in its intermediate location. The hotel is close enough to Potsdamer Platz to benefit from centrality, transport accessibility and cultural visibility, but it is also embedded in a more everyday urban environment connected with recreation, walking and neighbourhood-scale services. This dual positioning allows the hotel to connect two urban logics: the metropolitan economy

of offices, events and symbolic centrality, and the experiential economy of parks, pedestrian movement and local urban life.

From the perspective of revitalisation management, the most important feature of Grimm's Hotel is its consolidating rather than spectacular character. It does not operate as a landmark in the manner of Hotel Adlon, nor as an element of a centrally planned waterfront megaproject in the manner of HafenCity. Its function is more subtle: it stabilises the use of a street, supports mixed demand, increases the visibility of the area and contributes to continuity between high-intensity metropolitan spaces and everyday pedestrian environments.

The hotel's operational programme is also relevant. The combination of accommodation, restaurant functions, meeting facilities, fitness and sauna services extends both the range of users and the times of use. A purely overnight facility would generate weaker public-space effects. By contrast, a hotel with food, meeting and service functions can produce more continuous activity and a broader urban interface. The public value of such a hotel becomes visible when the investment is aligned with planning rules, mobility patterns, local services and environmental management.

5. Comparative perspective: German revitalisation contexts

The comparative cases show that hotel investments may operate through different revitalisation logics. HafenCity Hamburg demonstrates how hotels may form part of a planned mixed-use megaproject [25]. Their role is embedded in a broader urban development corporation, a waterfront identity and a phased programme of housing, offices, culture, mobility and public space. In this context, hotel functions support the credibility and intensity of a new urban district, but they also depend on the ability of the megaproject to avoid social selectivity and market-cycle vulnerability.

Dresden Neumarkt and Taschenbergpalais illustrate a heritage-led mechanism. Here, hotel functions are linked to the reconstruction of urban memory, symbolic capital and tourism demand [29]. The hotel becomes part of a wider attempt to restore the legibility of historical urban form. The risk is that heritage may be commodified,

becoming an aesthetic resource for visitors while everyday social functions are weakened.

Table 3. Comparative interpretation of hotel investments in selected German revitalisation contexts

Case	Revitalisation context	Main hotel-related mechanism	Key risk
HafenCity Hamburg	Megaproject and waterfront mixed-use transformation.	Institutional signalling and demand generation within a planned urban programme.	Selective urban space and high dependence on market cycles.
Dresden Neumarkt / Taschenbergpalais	Heritage-led reconstruction and tourism-oriented centrality.	Symbolic and cultural capital converted into tourism demand.	Commodification of heritage and overdependence on visitor economy.
Hotel Adlon Berlin	Reconstruction of representative urban identity.	Prestige, place branding and re-anchoring of symbolic centrality.	Social selectivity and enclave effects.
Grimm's Hotel am Potsdamer Platz	Consolidating investment in a mature transformation area.	Spatial activation, demand stabilisation and connection between centrality and everyday urbanity.	Competition, operational pressures and touristification if unmanaged.

Source: Author's own elaboration based on the doctoral manuscript and verified literature sources.

Hotel Adlon Berlin represents a symbolic-representational mechanism. Hospitality participates in the reconstruction of prestige and the image of the national capital. Such a hotel has high symbolic visibility and contributes strongly to place branding, but it may also generate enclave effects and reinforce social selectivity. Its revitalisation impact is therefore not reducible to prestige; it must be examined in relation to accessibility, public space and surrounding functions.

Compared with these cases, Grimm's Hotel has lower symbolic visibility but high analytical significance. It shows that revitalisation effects do not always depend

on flagship investments. A medium-scale hotel may support urban consolidation when it strengthens pedestrian continuity, diversifies demand, complements local services and operates within a planning regime capable of controlling nuisances such as traffic, deliveries, waste and noise.

6. Governance implications and monitoring protocol

The comparative analysis supports a conditional interpretation of hotel-led revitalisation. Hotels may contribute to urban regeneration, but only when they are embedded in a wider spatial and institutional framework. The decisive factor is not the mere presence of a hotel, nor even its architectural quality, but the relationship between the investment and the surrounding system of public space, services, mobility, governance and the local community.

Four conditions appear particularly important. The first is local value-chain embeddedness. The more a hotel purchases locally, employs locally and cooperates with neighbourhood services, the stronger its economic contribution to local development. The second condition is spatial permeability: the hotel should contribute to the street and not withdraw behind closed façades. The third condition is institutional coordination, including planning rules, negotiated obligations, monitoring and the capacity of public authorities to capture and redistribute part of the value generated by revitalisation. The fourth condition is social sensitivity, meaning that hotel development should be accompanied by measures limiting negative effects on housing, everyday services and access to public space.

These conditions lead to an important governance implication. Public authorities should not treat hotel investors merely as sources of capital, but as partners whose projects must be assessed ex ante and monitored ex post. This requires criteria that go beyond the number of rooms, jobs and tax revenues. Cities should evaluate whether a hotel strengthens pedestrian continuity, activates the ground floor, cooperates with local suppliers, contributes to public space and reduces operational nuisances. In sensitive urban areas, the public value of a hotel investment should be negotiated and made measurable.

A practical monitoring protocol should include five groups of indicators. The first concerns spatial performance: pedestrian flows, frontage quality, accessibility, perceived safety and continuity of public routes. The second concerns economic embeddedness: local employment, procurement, cooperation with local suppliers and visitor spending outside the hotel. The third concerns social balance: resident complaints, displacement signals, service substitution and the relationship between tourist and everyday functions. The fourth concerns institutional capacity: planning agreements, reporting duties, participation channels and corrective procedures. The fifth concerns environmental performance: energy use, waste management, delivery logistics, noise and links to green-blue infrastructure.

Table 4. Proposed monitoring protocol for hotel investments in revitalisation areas

Area of monitoring	Example indicators	Interpretive question
Spatial performance	Pedestrian flows, active frontage, night-time lighting, accessibility, perceived safety.	Does the hotel strengthen the everyday usability of the area?
Economic embeddedness	Local procurement share, jobs, cooperation with SMEs, visitor expenditure in nearby services.	Does the investment generate local spillovers or mainly internalise value?
Social balance	Rent pressure, resident complaints, service substitution, conflicts between users.	Are revitalisation benefits socially inclusive and not only visitor-oriented?
Institutional capacity	Planning agreements, reporting duties, participation mechanisms, corrective procedures.	Can the city steer, monitor and adjust the effects of the hotel investment?
Environmental responsibility	Energy use, water use, waste, deliveries, noise, connection to green-blue infrastructure.	Does the hotel reduce operational burdens and support sustainable urban transformation?

Source: Author's own elaboration based on the doctoral manuscript and verified literature sources.

The protocol is intentionally pragmatic. It does not require cities to prove full causality in every case, which would often be methodologically unrealistic. Instead, it encourages municipalities and investors to monitor mechanisms and warning signals. Such an approach is consistent with the actual nature of urban revitalisation, where multiple processes overlap and where governance often depends on the ability to adjust interventions during implementation.

7. Conclusions

The article has shown that hotel investments can make a substantive contribution to the revitalisation of neglected urban areas, but this contribution is neither automatic nor universally positive. A hotel may become a cornerstone of urban transformation, a consolidating element of a maturing district or an enclave that concentrates benefits while externalising costs. The outcome depends primarily on governance capacity, spatial integration and the structure of local economic relations.

The main theoretical contribution of the article is the proposal to treat the hotel as an urban actor operating across spatial, economic, social, institutional and environmental dimensions. This framework makes it possible to move beyond the narrow view of hotels as accommodation infrastructure and to evaluate them as instruments of urban management. The article also distinguishes the consolidating hotel investment as a type of intervention that does not initiate regeneration, but fills gaps, stabilises use and strengthens continuity in an area already undergoing transformation.

The practical implication is that cities should assess hotel projects through both ex ante and ex post criteria. Before approving or supporting a hotel investment, local authorities should examine whether it will contribute to street life, local value chains, public-space quality and inclusive development. After implementation, they should monitor not only financial and tourism indicators, but also spatial, social, institutional and environmental effects. Such an approach may reduce the risk that private gains from revitalisation are captured narrowly while public costs are borne by residents.

The study has limitations. The cases are drawn from the German context, which has specific planning traditions and institutional capacities. The article is based

on the reconstruction of mechanisms rather than on a full statistical measurement of causal effects. Further research should expand the quantitative component, compare Central and Eastern European contexts, and examine how platform-based tourism and short-term rental markets alter the relationship between hotels, revitalisation and local communities. In conclusion, Grimm's Hotel am Potsdamer Platz shows that medium-scale, non-flagship hotels can be analytically important precisely because they reveal the everyday mechanisms through which hospitality participates in the production, stabilisation and management of revitalised urban areas.

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DEVELOPMENT OF THE BEVERAGE MARKET IN UKRAINE: ANALYSIS AND MARKETING TRENDS

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Abstract. *The beverage market in Ukraine demonstrates a high degree of adaptability to crisis conditions, dynamically transforming under the influence of military and economic factors, migration processes, and the global trend toward a healthy lifestyle. Despite the challenges of war, economic instability, and fluctuations in purchasing power, Ukrainian producers are successfully implementing innovations by focusing on localizing production, the craft segment, and expanding their range of non-alcoholic products. The domestic beverage market exhibits characteristics of monopolistic competition, where the majority of production capacity and capital is concentrated in the hands of large national and international corporations, which dictate the standards for technical development and marketing communications. Modern beverage marketing in Ukraine is fully driven by changes dictated by current realities: a healthy lifestyle (Wellness & Health); premiumization and the "craft*

revolution"; patriotic marketing and support for local brands; and packaging transformation.

In 2023–2025, the beverage sector is demonstrating stable, outpacing growth relative to total wholesale turnover, thereby increasing its share in the wholesale market structure. Within the beverage category, alcoholic beverages remain dominant; however, for the third consecutive year, the role of the non-alcoholic segment has been strengthening, reflecting the greater sensitivity of non-alcoholic products to seasonality, promotional activities, and changes in product assortment. The challenges facing the wholesale beverage segment center on three key issues: financial strain due to payment deferrals and bonus schemes, rising logistics costs, and institutional restrictions on the alcoholic beverages segment. For wholesale operators, this means the need to strengthen accounts receivable management, improve inventory planning accuracy, optimize warehouse and transportation logistics, and develop compliance procedures for handling excise-taxable goods.

Pricing trends in the beverage sector from 2023 to 2025 are characterized by price growth in the beverage category outpacing overall inflation, with this gap becoming most pronounced in 2025. Cost pressures—which the NBU specifically notes in the context of energy shortages and additional business expenses—were exacerbated by the nature of beverages as an energy- and logistics-sensitive category; in the alcoholic beverages segment, regulatory frameworks—including minimum price mechanisms and compliance requirements—further compounded these pressures. This created an environment where business pricing strategies relied more on shorter priceadjustment cycles, more active promotional activities, product portfolio management, and an increased focus on operational efficiency in the supply chain than on simple price competition through reductions in base prices.

Keywords: *industry market, beverage market, marketing strategy, competitiveness, consumption volumes, consumer preferences, performance evaluation, digitalization.*

Problem Statement. The beverage market is of heightened relevance due to the combination of widespread consumption, the significant role of brands in shaping consumer behavior, the environmental impact of packaging, and the need to promote responsible consumption in the alcoholic beverages segment. During wartime, the humanitarian aspect takes on additional significance, as businesses play a role in meeting the basic needs of communities while simultaneously maintaining trust in institutions and fostering social interaction.

The relevance of this topic is amplified by changes in the communications landscape. Digital channels have accelerated the spread of messages but have made it more difficult to retain attention and trust. As a result, the importance of evidencebased, transparent, and measurable socially oriented initiatives is growing, as is the ability of companies to align their communications with real-world conditions to drive behavioral change. For the beverage market, this means the need to view communication as a systemic activity linked to the product portfolio, sales strategy, product assortment policy, and external market conditions, where the dynamics of wholesale and retail turnover and price fluctuations influence brand perception and communication priorities.

Analysis of Recent Studies and Publications. The Ukrainian beverage market is developing rapidly, and research in this area is gradually gaining in relevance and effectiveness. Scientific research in this field is multifaceted and promising; in particular: Zaychenko K.S. and Bolkovska A.P. [1] identified the main trends in the development of the alcoholic beverages market (Ukrainian consumers' shift toward domestically produced goods, the premiumization of consumption, digitalization, a new level of home consumption, and changing consumer tastes); Tyukha I.V. and Savchuk I.V. [2] examined the current state of the non-alcoholic beverage market both in Ukraine and abroad; M.Y. Gavryliak and Y.R. Shevchyk [5], using an expert-based consumer survey method, analyzed consumer preferences in the non-alcoholic beverage market; A. Boguslavska and N. Yazvinska [3] developed a system of indicators to measure the level of marketing resilience management in enterprises; Doronin V. [6] analyzed drinking water production. The article utilized data from the

State Statistics Service of Ukraine (wholesale and retail trade, consumer price indices). [7–12].

Purpose and Objectives of the Article. The purpose of the article is to analyze wholesale and retail turnover in the Ukrainian beverage market and to track the development of pricing policy through index indicators, pricing factors, and implications for sales and communication decisions. To achieve this objective, the following tasks were set: to analyze the wholesale turnover of beverages in Ukraine, broken down into alcoholic and non-alcoholic groups, and to determine the structural proportions and rates of change in these indicators; to analyze the retail turnover of beverages in Ukraine and assess the structure, dynamics, and regional differences in turnover formation; to characterize pricing policy in the Ukrainian beverage market through index indicators, pricing factors, and implications for sales and communication decisions;

Overview of the Main Content. The modern beverage market is undergoing rapid transformation; we are observing a global trend toward declining consumption of spirits in favor of non-alcoholic and low-alcohol alternatives. The Ukrainian market is adapting to these new realities, where local production, convenient packaging formats, and functionality remain priorities for manufacturers. Therefore, we can identify the main trends in the beverage market's development and track the following changes: a growing demand for non-alcoholic beverages (global markets are seeing a steady shift toward moderate consumption, where non-alcoholic beverages—including craft lemonades and functional drinks—are becoming the new norm); changes in the structure of the alcoholic beverage market (in Ukraine, beer and low-alcohol beverages account for over 80% of sales volume in physical terms; however, the dynamics of exports, imports, and consumption are constantly influenced by economic factors); the influence of European trends (the strong impact of young people and social media on the emergence of new tastes, which compels brands to constantly innovate in the "outof-home" segment (HoReCa and vending)); changes in consumer habits (the importance of manufacturers adapting to fluctuations in purchasing power and shifts in Ukrainians' taste preferences).

1. Marketing Trends in the Ukrainian Beverage Market

The main marketing trends shaping the beverage market are a shift in consumer preferences toward a healthy lifestyle (Wellness & Health), the digitization of sales (ecommerce), product personalization, and demand for eco-friendly packaging**.** Adapting to these trends is key to any brand's success. [1] The current landscape highlights marketing factors that can be divided into several key areas:

- *changing consumer preferences*: functionality and healthy lifestyles (growing demand for vitamin-enriched waters, kombucha, smoothies, and functional iced teas); Low/No Sugar (maximum reduction or complete elimination of sugar in favor of natural sweeteners such as stevia and erythritol); the No/Low Alcohol segment (nonalcoholic beer, wine, and low-alcohol beverages with minimal alcohol content are among the fastest-growing categories); Craft and experimentation (consumers are seeking new flavors, craft beer, niche alcoholic beverages, and natural ingredients); Aesthetics and self-expression (beverages have become part of a lifestyle: a modern product must have a striking design that's Instagram-friendly);

- *digitalization and the growth of e-commerce*: omnichannel retailing (the lines between offline and online shopping are blurring; brands must have a presence on marketplaces and offer user-friendly proprietary apps); delivery and convenience (consumers expect fast home delivery of beverages); the influence of social media (Tik-Tok and lifestyle bloggers are driving viral demand for certain beverage categories, such as matcha lattes and ginger shots);

- *environmental friendliness and sustainability (ESG*): eco-friendly packaging (moving away from plastic in favor of biodegradable materials, glass, or recyclable aluminum); packaging transformation (aluminum cans are rapidly replacing PET and glass containers due to their cooling speed and ease of recycling; the popularity of small-volume packaging (0.25–0.33 L) for quick on-the-go consumption); responsible production (consumers are choosing brands that prioritize reducing their carbon footprint and support local production);

- *personalization and innovation*: personalized offers (using Big Data to create personalized discounts and promotions); limited editions (releasing limited-edition

flavors or collaborations with celebrities and influencers); premiumization (instead of mass-produced, cheap products, urban consumers are opting for unique offerings). This trend toward premiumization is driving the rapid growth of local breweries and cideries, as well as the emergence of Ukrainian startups producing and delivering ready-to-drink, preservative-free, premium-quality cocktails.

- *patriotic marketing and support for local brands:* economic patriotism (consciously choosing domestic brands to support the economy, increasing the share of Ukrainian wines and local craft products, and actively incorporating national identity, charitable initiatives, and fundraisers for the Armed Forces of Ukraine into promotional campaigns). [2.3]

The effectiveness of the beverage market's development in Ukraine depends largely on the behavior of the target consumer and the tools used to promote beverages. These aspects are intertwined, as it is the specific behavior of the target audience (TA) that determines the choice of promotional tools. A deep understanding of the customer helps ensure that the advertising budget is not wasted. The following key consumer trends can be identified: sober, conscious choices (young people are switching to nonalcoholic alternatives en masse); thrift and rationality (some shoppers choose retailers' private-label brands); the search for new experiences (people are buying not just a liquid, but an emotion or a sense of enjoyment); attention to ingredients (customers carefully examine the origin of ingredients); and the home bar (there is a growing trend toward making cocktails at home). When it comes to beverage promotion tools, marketers increasingly rely on targeted channels: influencer marketing (engaging bloggers to create viral trends); emotional storytelling (sharing the unique story behind a brand's creation); gamification in apps (creating interactive loyalty programs for customers); targeted video ads (short, eye-catching clips on TikTok and Reels); collaborations (joint limited-edition lines with other well-known brands); and sampling and tastings (free samples to lower the barrier to purchase). [4,5,6]

It should be noted that the *Ready-to-Drink* low-alcohol beverage sector (readyto-drink cocktails in cans) in Ukraine is growing thanks to a young audience

(ages 21– 35) that is turning away from hard liquor in favor of low-alcohol mixes with unusual fruit or botanical flavors (lavender, bergamot, thyme).

2. Wholesale beverage sales in Ukraine

Let's examine the wholesale turnover of beverages in value terms, in thousands of UAH excluding VAT, broken down into alcoholic and non-alcoholic beverages (including water and juices), as well as total wholesale turnover as a basis for structural comparisons (Tables 1–3)

Table 1. Wholesale turnover of beverages and their share in total wholesale turnover, 2023–2025, in thousands of UAH

Indicator	2023	2024	2025
Total wholesale trade in beverages, W	2,145,780,123.6	2,398,412,905.4	2,612,990,477.9
Alcoholic beverages, A	52,120,331.8	59,410,902.6	65,118,740.9
Non-alcoholic beverages, water, and juices, N	34,330,440.5	38,469,612.1	43,786,492.3
Total beverages, B = A + N	86,450,772.3	97,880,514.7	108,905,233.2
Share of beverages in W, %	4.03	4.08	4.17
Alcohol content in B, %	60.29	60.70	59.79
Percentage of non-alcoholic beverages in B, %	39.71	39.30	40.21

Source: compiled by the author based on [7,8]

The data show that the beverage segment accounts for 4.03–4.17% of total wholesale turnover. The share is trending moderately upward, indicating that beverage turnover is growing faster than total wholesale turnover. This is important for the wholesale channel for two reasons. First, an increase in the share of beverages in the wholesale portfolio is usually accompanied by changes in requirements for warehouse and transportation infrastructure, since beverages are bulky products that are sensitive to storage costs and inventory turnover rates. Second, the growing role of beverages increases wholesale companies' dependence on highly competitive products with significant promotional activity, where sales performance is tied to the retail chains' marketing calendars and to contractual supply terms. The alcoholic

beverage category dominates the beverage market, accounting for approximately 60% of beverage sales by value. Alcohol's dominance in value terms is explained by a combination of a higher average unit price and a greater concentration of distribution chains in the wholesale channel. In contrast, non-alcoholic beverages, water, and juices are more often supplied through mixed models, where—alongside wholesale distributors—direct contracts between manufacturers and retail chains, as well as contract logistics, play a significant role. As a result, the non-alcoholic beverage segment is capable of growing faster in wholesale turnover through the expansion of product ranges and promotional cycles; however, a portion of the turnover is generated outside of traditional wholesale operations.

Table 2: Trends in Wholesale Turnover of Beverages in Ukraine, 2023–2025

Indicator	Absolute Change 2024–2023, thousand UAH	Growth rate 2024/2023, %	Absolute change 2025–2024, thousand UAH	Growth rate 2025/2024, %
Total wholesale trade turnover, W	252,632,781.8	11.77	214,577,572.5	8.95
Total beverages, B	11,429,742.4	13.22	11,024,718.5	11.26
Alcoholic beverages, A	7,290,570.8	13.99	5,707,838.3	9.61
Non-alcoholic beverages, water, and juices, N	4,139,171.6	12.06	5,316,880.2	13.82

Source: compiled by the author based on [7,8]

A comparison of growth rates shows that beverages consistently outperform total wholesale sales. In 2024, beverage growth stands at 13.22% compared to 11.77% for W; in 2025, 11.26% compared to 8.95%. This means that beverages are strengthening their presence in the wholesale portfolio not just sporadically, but as a three-year trend. At the same time, the internal logic of growth for 2025 reveals differences among subcategories: alcohol is growing more slowly than in the previous year, while the nonalcoholic group is accelerating. This pattern aligns with a

situation where the alcoholic beverages segment is more dependent on regulatory frameworks, distribution controls, and price elasticity of demand, while non-alcoholic beverages are more responsive to seasonality, promotional activity, and the expansion of product offerings within the fast-moving consumer goods (FMCG) sector.

To deepen the structural analysis, it is advisable to assess the ratio of alcohol to non-alcoholic beverage sales and track changes in this ratio over time. In 2023, the A/N ratio is 1.52 times; in 2024, 1.54 times; and in 2025, 1.49 times, indicating a slight weakening of alcohol's dominance for the third consecutive year. In practical terms, this indicates an expansion of the non-alcoholic segment's role in the wholesale market, which may be the result of more intensive promotional activities, an increase in the share of value-added products within the non-alcoholic portfolio, as well as a shift in consumer behavior toward cheaper or functional products, where manufacturers are actively promoting new offerings through wholesale channels.

Table 3. Key structural ratios in the beverage segment, 2023–2025

Indicator	2023	2024	2025
A/N ratio, times	1.52	1.54	1.49
Difference between A and N fractions in B, vol. p.	20.58	21.40	19.58
Year-over-year increase in the share of beverages in W	–	0.05	0.09

Source: compiled by the author based on [7,8]

An increase in the share of beverages in total wholesale sales by 0.05–0.09 percentage points per year within the large W is a significant signal for wholesale operators. First, an increase in beverage turnover typically requires investment in working capital, as beverages have a high turnover rate, and contract payment terms in B2B remain substantial. Second, the growing role of beverages changes a wholesaler's risk profile, as margins in many beverage subcategories are low, and financial performance depends significantly on payment discipline, the level of losses in the supply chain, and the effectiveness of inventory management.

The beverage wholesale segment in 2023–2025 operates in an environment characterized by a combination of commercial and institutional constraints. The

commercial challenges stem primarily from pressure exerted by retail chains on supply terms. The beverage sector is characterized by a complex system of bonuses, retroactive bonuses, marketing payments, and paid shelf space, which reduces the actual margins of wholesale channel participants. At the same time, widespread payment deferrals shift the financial burden onto the wholesaler, who is forced to finance accounts receivable either with their own funds or through credit. During periods of rising financing costs, this transforms growth in turnover into an increased need for liquidity rather than a proportional increase in profit. For alcoholic beverages, this problem is exacerbated by the fact that some small-scale retail counterparties carry a higher risk of late payments, whereas for the non-alcoholic portfolio, a significant portion of the risk stems precisely from chain contracts with longer payment deferrals.

The operational challenges in the beverage sector are driven by logistics costs. Beverages are transported in large volumes by weight, require high storage density, are susceptible to container damage, and certain items are temperature-sensitive. Under wartime conditions, costs for energy, backup power for warehouses, transportation security, insurance, and the restoration of logistics routes increase, which directly raises the cost of wholesale operations. As a result, wholesalers are forced to reduce inventories to the bare minimum, which lowers service levels during peak demand periods. For non-alcoholic beverages, seasonality is an additional factor, as sharp sales spikes create a need for temporary expansion of warehouse capacity and transportation resources. Seasonality also exists for alcoholic beverages, but its amplitude is typically lower; instead, sensitivity to regulatory parameters and changes in distribution controls is higher.

The institutional framework of these challenges is particularly evident in the alcoholic beverages segment. The presence of excise taxes, labeling requirements, licensing, sales restrictions, and supply chain controls increases transaction costs and raises barriers to entry. Wholesale companies bear compliance costs and the risk of fines, so they seek to work with transparent counterparties, which narrows the sales market and intensifies competition in the legal sector. At the same time, there is a risk

of the market shifting to the informal sector, which distorts competitive conditions; as a result, legal wholesale operators sometimes lose out on price to those who minimize tax and regulatory costs. This explains why growth in the alcohol sector may slow in 2025 against the backdrop of accelerating growth in the non-alcoholic beverage segment, where institutional barriers are lower, and competition occurs primarily through promotions and product innovation rather than regulatory restrictions.

The issue of interpreting growth rates in value terms warrants special attention. For beverages, the increase in turnover in hryvnia reflects the combined effect of price changes and changes in physical volumes. In 2023–2025, the Ukrainian market will be characterized by fluctuations in logistics, packaging, and energy costs; therefore, part of the growth in value-based turnover may be driven by inflation. At the same time, the acceleration of the non-alcoholic beverage segment in 2025, coupled with more moderate growth in the alcoholic beverage segment, is consistent with the fact that the non-alcoholic portfolio tends to expand more frequently through new SKUs, functional beverages, changes in packaging formats, and more active promotional cycles, which stimulate sales even when physical volumes for individual SKUs remain modest.

3. Retail Sales of Beverages in Ukraine

The analysis covers sales trends for alcoholic and non-alcoholic beverages in 2023–2025, changes in the structure of retail beverage sales, as well as regional differences in sales patterns. The retail beverage segment is sensitive to fluctuations in household income, price conditions, inflationary trends, seasonal consumption patterns, and the spatial concentration of retail infrastructure, which leads to uneven development in both temporal and territorial dimensions. An analysis of retail beverage sales makes it possible to identify trends in the redistribution of consumer demand across product groups, assess the role of beverages in shaping the retail basket, and determine the characteristics of regional market differentiation amid transformations in the economic environment.

Table 4. Retail sales of beverages in Ukraine and their share in total retail sales, 2023–2025, in millions of UAH

Indicator	2023	2024	2025
Total retail sales, R	1,816,540.7	2,064,881.9	2,291,330.6
Alcoholic beverages, RA	96,840.6	112,774.3	125,621.8
Non-alcoholic beverages, water, juices, RN	79,220.4	91,386.7	105,994.2
Total beverages, RB	176,061.0	204,161.0	231,616.0
Share of beverages in R, %	9.69	9.89	10.11
Share of alcohol in RB, %	55.00	55.23	54.23
Share of non-alcoholic beverages in RB, %	45.00	44.77	45.77

Source: Compiled by the author based on [7,8]

The retail beverage segment is showing steady growth in sales value over a threeyear period. Total retail sales are projected to rise from 1,816,540.7 million UAH in 2023 to 2,291,330.6 million UAH in 2025, with beverages increasing their share of the retail basket from 9.69% to 10.11%. The increase in the share of beverages in retail is consistent with the nature of demand for everyday consumer goods, as well as with the fact that retail trade is recovering unevenly under wartime conditions, yet consumer demand is concentrated in basic categories where beverages maintain stable sales. At the level of total retail trade, the State Statistics Service and public reports from official statistical channels show an increase in retail trade turnover in 2025 compared to 2024 for the January–September period, confirming an overall upward trend in the retail market, within which beverages typically perform more steadily than non-food categories.

The growth rates for beverages exceed those of total retail sales in 2024 and remain higher or comparable in 2025. Within the beverage category, a shift in the balance between subcategories can be observed. Alcohol shows strong growth in 2024, while the growth rate slows in 2025. The non-alcoholic segment maintains a high growth rate in 2024 and accelerates in 2025. This trajectory aligns with market logic, where the alcoholic segment is more dependent on regulatory parameters, distribution controls, the effects of price adjustments, and the redistribution of

demand across consumption formats, whereas non-alcoholic beverages are more strongly influenced by seasonality, retail chains' promotional activity, product assortment expansion, and changes in consumer habits within daily demand. The dynamics of sales value are also influenced by the inflationary backdrop and business costs, as reflected in the NBU's assessments of price pressures related to labor and energy costs [20].

Table 5. Trends in Retail Turnover of Beverages in Ukraine, 2023–2025

Indicator	Absolute change 2024–2023, million UAH	Growth rate 2024/2023, %	Absolute change 2025–2024, million UAH	Growth rate 2025/2024, %
Total retail sales, R	248,341.2	13.67	226,448.7	10.97
Total beverages, RB	28,100.0	15.96	27,455.0	13.45
Alcoholic beverages, RA	15,933.7	16.45	12,847.5	11.39
Non-alcoholic beverages, water, juices, RN	12,166.3	15.36	14,607.5	15.98

Source: compiled by the author based on [7,8]

The structure of retail beverage sales in 2023–2025 shows that alcoholic beverages dominate at around 54–55% of the total, although the share of the nonalcoholic segment is expected to grow by 2025. This shift in market shares aligns with a decline in the dominance of the alcoholic category, as the non-alcoholic segment gains additional drivers through more active product innovation, promotional campaigns, and broader coverage of consumption formats. Retail chains increasingly use non-alcoholic beverages as a category for frequent promotions, driving foot traffic, and developing private labels, which boosts value-based sales even amid modest growth in physical volumes for individual SKUs. For alcoholic beverages, retail valuebased sales are often determined by shifts in consumption patterns across price segments, as well as by shifts in demand between home

consumption and the HoReCa segment, which in 2023–2025 will remain dependent on the security situation and household incomes [7,8].

Regional differences in beverage retail sales should be analyzed through two dimensions: the concentration of sales in major economic centers and differences in the share of beverages in the regional retail basket. Turnover concentration typically correlates with population size, the level of urbanization, income, the presence of chain stores, and logistical accessibility. To quantitatively illustrate regional concentration, the distribution of beverage sales is presented by a group of the largest regional markets and the remaining regions, which makes it possible to calculate the level of concentration and highlight differences in demand structure (Table 6).

Table 6. Regional Distribution of Retail Turnover in Beverages, 2025

Regional Group	Beverage Turnover, million UAH	Share of RB 2025, %
Kyiv	46 102.8	19.90
Dnipropetrovsk Oblast	22,365.4	9.65
Lviv Oblast	16,583.7	7.16
Odesa Oblast	15,772.1	6.81
Kharkiv Oblast	14,308.5	6.18
Kyiv Oblast	12,419.3	5.36
Other regions	104,064.3	44.94
Total	231,616.0	100.00

Source: compiled by the author based on [7,8]

In 2025, the combined share of the six largest regional markets in beverage retail sales will be 55.06%, reflecting the high concentration of consumer demand and retail infrastructure in the largest metropolitan areas and industrial centers. Kyiv's dominance is explained by the concentration of employment, higher incomes, a greater density of modern retail formats, and a broader product assortment in retail chains, including premium items that drive up sales value. The Dnipropetrovsk, Lviv, and Odesa regions are characterized by the significant role of regional centers and transportation and logistics hubs, which boosts sales in retail chains. In 2023–2025,

the Kharkiv region will be strongly influenced by security risks, causing a shift in the structure of demand and retail formats, while sales dynamics will be more dependent on the restoration of retail infrastructure and migration processes—which, in value terms, may manifest as more subdued growth or higher volatility.

Regional differences in the beverage mix are best illustrated by the shares of alcoholic and non-alcoholic beverages within the beverage category, broken down by region type. In higher-income metropolitan areas, a larger share of alcoholic beverages in value-based turnover is more commonly observed due to premium segments, a wider selection of imported products, and more developed modern retail channels. In regions with lower income levels and a smaller presence of modern retail formats, the share of non-alcoholic beverages tends to grow due to high promotional activity and a focus on everyday-use goods.

Table 7. Structure of Retail Beverage Sales by Region Type, 2025

Region Group	Share of Alcoholic Beverages, %	Share of non-alcoholic beverages, %
Metropolitan areas with a high concentration of retail chains	56.40	43.60
Industrial regions with large cities	54.10	45.90
Regions with a predominance of small towns and rural areas	51.80	48.20

Source: compiled by the author based on [7,8]

Differences in beverage structure across regional groups are shaped by a combination of income levels, retail formats, and consumer behavior. Urban agglomerations exhibit a higher share of alcohol in value terms due to the presence of premium products and well-developed specialized channels; however, the nonalcoholic segment remains significant across all types of regions and demonstrates high growth rates thanks to promotions, the development of functional beverage categories, and seasonal peaks. Regional markets with a higher proportion of small towns and rural areas tend to have a structure where alcoholic beverages

account for a smaller share of the beverage market, which is consistent with price-sensitive demand and a shallower product assortment in modern retail formats.

The factors restraining the growth of beverage retail sales in 2023–2025 are distinctly practical in nature. The first factor is a shift in purchasing power and a redistribution of consumption across price segments, as part of the demand shifts from premium products to the mid-range or economy segments. The second factor is the rise in retailers' operating costs related to energy, logistics, and labor, which affects markup margins, the depth of promotions, and the availability of product assortments. The third factor is the uneven regional recovery of retail infrastructure, which directly impacts sales in areas with heightened security risks. Under these conditions, retail chains are strengthening category management, focusing on fast-moving items, expanding their private labels, and increasing the frequency of promotions to maintain foot traffic—a trend particularly noticeable in the non-alcoholic beverage segment.

Over a three-year period, retail sales of beverages have outpaced overall retail sales and shown moderate growth in their share of the retail basket. Within the beverage category, alcohol retains a larger share of sales by value, but the non-alcoholic segment is strengthening its presence thanks to faster growth. Regional concentration of sales is high, with the largest metropolitan areas and industrial centers dominating, while structural differences between regions are driven by income levels, retail formats, product assortment depth, and promotional intensity.

4. Pricing Policy in the Ukrainian Beverage Market

Pricing policy in the Ukrainian beverage market for 2023–2025 is shaped by the interplay of inflationary trends, production and logistics costs, tax and regulatory requirements, and competition in retail channels. To assess the results of this policy at the national level, it is advisable to rely on the consumer price index and indices for relevant product groups, as the index-based approach reflects the average rate of price change over time, sets the framework for manufacturers' and distributors' price adjustments, and determines the behavior of retail chains regarding markup, promotional activity, and category pricing architecture. Official reports from the State

Statistics Service of Ukraine confirm a fluctuating inflation trajectory: the Consumer Price Index stood at 105.1% in 2023, 112.0% in 2024, and 108.0% in 2025.

Table 8. Consumer Price Indices in Ukraine and Beverage Price Indices, December compared to December of the previous year, %

Indicator	2023	2024	2025
Consumer Price Index	105.1	112.0	108.0
Food and Non-Alcoholic Beverages	104.0	114.1	110.2
Non-alcoholic beverages	106.9	113.2	115.6
Alcoholic beverages, tobacco products	109.6	113.2	117.3

Source: compiled by the author based on [9–11]

The dynamics of the indices show that prices for beverages are rising faster than the general index in 2023 and especially in 2025, when overall inflation slowed to 8.0%, but non-alcoholic beverages rose by 15.6%, while the aggregate for alcoholic beverages and tobacco rose by 17.3%. This indicates an intensification of sector specific price pressure in the beverages category, where price increases were driven not only by macro inflation but also by the cost structure of the supply chain, the behavior of retail formats, and regulatory parameters in the excise-taxed segment.

A national assessment of pricing policy requires distinguishing between two pricing frameworks: non-alcoholic and alcoholic. For non-alcoholic beverages, cost factors and retail competition dominate, while for alcoholic beverages, in addition to costs, regulatory mechanisms, compliance costs, and the tax burden play a significant role, which increases price rigidity and reduces the scope for flexible shelf-price adjustments outside of promotions. In 2023, non-alcoholic beverages rose in price by 6.9% compared to a general index of 5.1%, reflecting the effects of supply chain recovery, rising packaging and logistics costs, as well as a shift in demand structure, with part of consumption moving toward more “premium” products or more convenient packaging formats. In 2024, inflation accelerated to 12.0%, and the soft drink index reached 13.2%, consistent with mounting cost pressures on manufacturers and retailers. In 2025, the price trajectory for non-alcoholic beverages became the most strained, at 115.6% compared to a general index of 108.0%, which

is typically associated with the category's high sensitivity to logistics, energy, and packaging costs, as well as promotional competition, where retailers offset discounts on promotional offers by raising base prices on non-promotional items, thereby maintaining the category's gross revenue.

The cost-driven nature of beverage prices nationwide in 2023–2025 is best explained by cost pass-through. For beverage manufacturers, the cost structure includes a high proportion of energy-intensive and logistics-sensitive items, namely electricity and heat for production processes, water, raw material preparation, packaging, palletizing, warehouse logistics, transportation of heavy products with a relatively low unit price per kilogram, as well as labor costs and technical maintenance of equipment. During wartime, additional costs arise related to ensuring uninterrupted operations, backup power, security, and insurance against logistics risks. The NBU explicitly notes that the slowdown in inflation was driven by additional costs incurred by enterprises to ensure uninterrupted operations amid energy shortages and the rapid rise in administratively regulated prices. For beverages, this channel is particularly significant, as even minor changes in energy and logistics costs quickly multiply due to large shipment volumes and the need to maintain inventory levels in the retail chain [9–11].

Within the national pricing system, the retail channel exacerbates cost pressures due to its own cost structure and the mechanics of category management. In 2023– 2025, retail chains operated in an environment where costs for energy, labor, rent, logistics, and losses from spoilage or damage rose unevenly, while consumers demonstrated high price sensitivity in everyday categories. As a result, chains made more active use of price segmentation and differentiated markups by packaging formats and price segments, while also strengthening the role of promotions as a tool for driving foot traffic. In the beverage category, promotions carry greater weight because demand is often elastic, switching between brands occurs quickly, and the cost to the consumer of changing their choice is minimal. This contributes to the formation of a two-tier pricing system, where base prices are raised to cover costs, while promotional prices are lowered for a limited period to ensure turnover and meet

sales targets. The impact of promotions on average price indices manifests through the redistribution of sales between promotional and non-promotional segments, as well as through the substitution of items in the shopping basket in favor of those with larger discounts, which complicates the simple interpretation of the “average price” as a direct function of cost.

The alcohol segment is subject to an additional regulatory framework within the national pricing policy. According to official indices, the “alcoholic beverages and tobacco products” aggregate grew by 9.6% in 2023, 13.2% in 2024, and 17.3% in 2025. Even when aggregated with tobacco products, this trend indicates a consistently high rate of price increases, which is consistent with two factors. The first factor relates to tax and regulatory rules governing the circulation of excise goods, which increase the transaction costs of legal sales and limit the scope for price concessions beyond permitted mechanisms. The second factor relates to the existence of government tools to influence minimum prices, which set the lower limit of the price range and alter competitive dynamics among market participants. The Ministry of Economy has published a draft resolution approving the procedure for determining minimum wholesale and retail prices for alcoholic beverages, reflecting the continued presence of a minimum price mechanism within the regulatory framework. For businesses’ pricing strategies, this means that in the alcoholic beverages category, price changes tend to take the form of discrete adjustments within the regulatory framework rather than smooth price-based competition; consequently, the main areas of competition become product assortment, availability, sales format, marketing, and customer loyalty.

At the national level, compliance with regulations governing the retail sale of alcohol is also of significant importance. Changes in operating conditions, inspections, and requirements for the organization of trade in excise goods create additional costs for retailers and affect prices through the mechanism of passing on these costs to the markup. For example, the State Tax Service announced the introduction of minimum wage requirements in the retail trade of alcohol and other excise goods, which directly increases legal retailers’ personnel and administrative

costs. In national pricing policy, such changes are not always immediately reflected in the index; however, they increase price pressure and alter the market structure, stimulating consolidation in favor of operators capable of absorbing compliance costs without losing competitiveness [9– 11].

An additional factor in national beverage pricing policy is the exchange rate and import channels. For non-alcoholic beverages, the import component is often concentrated in packaging, concentrates, additives, equipment, and certain ingredients, while for alcoholic beverages, it manifests itself in both imports of finished products and imported components for production, as well as in the premium segment, where the share of imported items is higher. Fluctuations in exchange rates and import costs create an asymmetry in pricing decisions, where cost increases are quickly passed on to prices, while cost reductions are passed on more slowly due to businesses' desire to restore margins or build reserves against the risk of future cost spikes. In 2023–2025, this mechanism is exacerbated by uncertainty regarding logistics routes, insurance costs, and the risk of supply delays, which, for beverages with shorter shelf lives or high promotional intensity, creates additional pressure on inventory planning and, consequently, on pricing decisions.

Within the nationwide pricing system, the difference between the rate of price growth for beverages and the rate of price growth for the broader food sector plays a significant role. In 2023, the "food and non-alcoholic beverages" index stood at 104.0%, in 2024 at 114.1%, and in 2025 at 110.2%. A comparison of these figures with those for "non-alcoholic beverages" shows that non-alcoholic beverages rose in price faster than the aggregate food component in 2023 and especially in 2025. There is a practical explanation for this. Non-alcoholic beverages are more sensitive to packaging and logistics than most food products and are also characterized by more intensive promotional activities, which influences retailers' policies regarding base prices and supply terms. Furthermore, competition for shelf space and marketing budgets is significant in the non-alcoholic beverages category, generating additional "non-price" costs for manufacturers and distributors that are factored into the prices of nonpromotional items [9–11].

The national pricing policy for beverages also includes a behavioral dimension of demand. During periods of accelerating inflation, shoppers are more likely to switch to larger package sizes with a lower price per unit of volume, are more active in purchasing promotional items, increase their share of retailers' private labels, and shift demand toward lower price segments. For manufacturers and retailers, this creates a need to revise the category's "price tiers," where the product range must be organized by affordability levels—from economy to premium—with a sufficient number of items in the mid-range segment to drive sales in the mass market. In 2024, when the overall index stood at 112.0% and beverage indices reached 113.2%, the strategy of "customer retention" through promotions and affordable SKUs gained increased importance. In 2025, with an overall index of 108.0% and significantly higher beverage indices, this effect intensified, as beverages became one of the channels through which consumers felt price increases more acutely than the average inflation rate.

The relationship between pricing policy and turnover in the sales channel deserves special attention. Beverages, especially non-alcoholic ones, have a high turnover rate but also face intense competition; therefore, manufacturers and retailers must strike a balance between margin and volume. Price increases without promotional support can reduce sales volume and increase the risk of inventory buildup, while frequent promotions lower the average margin and require compensation through the base price or supply chain efficiency. In 2023, when inflation was relatively moderate, there was more room for more flexible pricing, which was reflected in lower beverage index values compared to 2024–2025. In 2024–2025, cost pressures intensified, increasing the importance of logistics optimization, consolidating shipment batches, contract planning, and reducing losses, as these tools allow for limiting the growth of retail prices without compromising operational stability [12].

Conclusions

An analysis of domestic and foreign beverage trade revealed that in 2023–2025, wholesale beverage trade grew at a faster rate than total wholesale trade, and

the share of beverages in the wholesale portfolio increased, indicating the category's growing importance within the wholesale structure. Alcoholic beverages accounted for the majority of the wholesale turnover of beverages, at about 60%; at the same time, the role of non-alcoholic beverages strengthened in 2025, which is consistent with seasonality, promotional activity, and the renewal of the product range of non-alcoholic items. Retail sales of beverages showed steady growth in 2023–2025, and the share of beverages in total retail sales increased, confirming the category's high stability in the consumer basket. The structure of retail sales continued to favor the alcoholic beverages segment, although the share of non-alcoholic beverages within the broader beverages category grew, and a regional analysis revealed a high concentration of sales in the largest metropolitan areas and industrial centers. An analysis of pricing policies in the beverage market revealed that beverage price indices were growing faster than the overall consumer price index, which placed additional pressure on demand, heightened the importance of promotions, pricing strategies for product assortments, and cost control in the supply chain, and, for the alcoholic beverages segment, further highlighted the impact of tax and regulatory factors.

To successfully maintain their positions in the beverage market in the coming years, companies need to focus on three areas: the energy drink segment (demand for energy and functional beverages will remain consistently high due to high stress levels, heavy workloads, and the specific nature of demand among military personnel and volunteers); logistics optimization (localization of raw material sources and diversification of distribution channels, including the development of proprietary online stores and fast delivery); flexible pricing (creating high-quality products in the mid-price segment to retain the loyalty of a customer base sensitive to currency devaluation and inflation).

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THE ROLE OF MULTIMODAL ANALGESIA IN THE TREATMENT OF PATIENTS WITH DISTAL METAPHYSEAL FRACTURES OF THE RADIUS AT THE OUTPATIENT STAGE

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Abstract. *Fractures of the distal metaphysis of the radius (typical radial fractures) are quite common, especially in elderly people. The results of treatment for such patients remain unsatisfactory. One of the most serious complications of a fracture of the radius in a typical location is the development of post-traumatic neurodystrophic syndrome. A promising direction for the prevention of possible complications is the use of multimodal analgesia. In all 63 observations during the first three days in all cases of distal metaphyseal fracture of the radius, the pain syndrome was neuropathic in nature. For local anaesthesia, a 2% solution of lidocaine in a volume of 10-15-20 ml was used. It was injected into the hematoma of the radial fracture after identifying the location of the needle in it. The exposure was at least 5-10 minutes, until the effect of complete anaesthesia was achieved. Dexalgin® was administered intramuscularly. The injectable form of the drug was prescribed for short-term treatment of moderate to severe pain in the perioperative*

period, followed by a switch to the tablet form. No rough manipulations were performed. After aligning the fragments in a position of slight stretching and slight flexion or extension of the wrist, the fragments were fixed with plastic bandages. After 2 weeks, if necessary, the hand was gradually brought to a neutral physiological position. After 4-6 weeks, following X-ray control, the bandage was removed and further active rehabilitation treatment was carried out.

The proposed multimodal analgesia with Dexalgin® in patients with distal metaphyseal fractures of the radius in the early outpatient stage was justified and effective. Fifty-two patients (82.5%) highly rated the treatment results, describing pain as tolerable and the function of the injured arm as satisfactory, with a score of 33.2± 0.4 on the DASH scale.

Key words: *multimodal analgesia, fracture of the distal metaphysis of the radius.*

Relevance of the problem. Distal metaphysis fracture of the radius (DMFR, fracture of the radius in a typical location) is quite common, especially in elderly people. The vast majority of patients are treated conservatively for a number of objective reasons. The results of treatment for such patients remain unsatisfactory in 30% of cases [1, 2, 3]. This is due to a number of reasons. The short distal fragment of the fracture complicates repositioning and maintaining the corrected position. The technique of manual repositioning followed by fixation of the fragments with a splint does not exclude the possibility of secondary displacement of the fracture.

One of the serious complications of a fracture of the radius in a typical location is the development of post-traumatic neuro-dystrophic syndrome. Risk factors for its development include gender, age, and concomitant diseases. The trigger for the development of DMFR is pain syndrome. Tension in the forearm muscles leads to additional tissue trauma and increases the risk of complications. Severe pain syndrome leads to neurogenic vasoconstriction of blood vessels, dilation of precapillary sphincters, microvessels, especially venules, and tissue oedema. Therefore, a promising direction for the prevention of possible complications is

multimodal analgesia, low-trauma correction, rational fixation of fragments, and drug therapy at an early outpatient stage.

The aim of the study is to determine the effectiveness of the proposed multimodal analgesia in patients with fractures of the distal metaphysis of the radius.

Materials and methods. We monitored 63 patients with fractures of the distal metaphysis of the radius. Most of them were women (43 - 68.3%). Thirty-eight patients (60.4%) were over 55 years of age. In this group of patients, Kolesa fractures were found in 49 cases, and Smith fractures in 14 (77.8% and 22.2%, respectively). Women constituted the vast majority (52 - 82.5%). Unstable fractures requiring surgical treatment and crack-type fractures were not analysed. In all cases, displacement correction was performed, followed by fixation with a plastic (14 - 22.2%) or plaster (49 - 82.5%) bandage. The patient was given a preliminary explanation of all the upcoming procedures. 2% lidocaine solution in a volume of 10-15-20 ml was used for local anaesthesia. It was injected into the hematoma of the radius fracture after identifying the location of the needle in it. The exposure was at least 5-10 minutes, until the effect of complete anaesthesia was achieved. Dexalgin® was administered intramuscularly. The injectable form of the drug was prescribed for short-term treatment of moderate to severe pain in the perioperative period, followed by a switch to the tablet form.

The integral indicator of pain is its subjective assessment by the patient. There are many aspects and ways of measuring its intensity. The most comprehensive and convenient method in clinical practice for patients with fractures of the radius in a typical location is the visual analogue scale (VAS), which ranges from no pain to unbearable pain. Patients were instructed to assess their sensations according to the following principles. On a scale 10 cm (100 mm) long, the level of pain intensity is marked with a dot. The starting point indicates no pain - 0, followed by mild pain, moderate pain, severe pain and the end point - unbearable pain - 10. Despite its apparent simplicity, the VAS is widely used in clinical practice and is generally recognised by clinicians.

DN4 - a questionnaire used to diagnose neuropathic pain. During the interview, questions were asked to characterise the pain as neuropathic. For a subjective, standardised assessment of hand function, a specific questionnaire was used: DASH - Disability of the Arm, Shoulder and Hand Outcome Measure. Questionnaire on the results and disability of the arm and hand. In 2005, it underwent a process of cross-cultural adaptation into., and the is available on the Ukrainian -language version website of the Institute of Labour and Health (Canada) - http://www.dash.iwh.on.ca. The main section of the DASH questionnaire (incapacity/symptom scale) consists of 30 questions related to the condition of the hand over the past week. Each question has 5 answer options, rated on a scale of 1 to 5. The total score for all items is then converted to a 100-point scale. Thus, DASH assesses upper limb disability from 0 (no disability, good function) to 100 (severe disability). The interactive scale is available at https://sites.google.com/site/71microsurgery/vopros-vracu/dash

In 59 observations during the first three days in patients with fractures of the radius in a typical location, the pain syndrome was neuropathic (of varying severity). This was due to anatomical predisposition. The carpal tunnel is a narrow tunnel formed by the bones of the wrist and the transverse ligament of the wrist. Median nerve neuropathy in fractures of the radius in a typical location consists of trauma and compression of the median nerve in the canal cavity. Therefore, adequate multimodal analgesia was very important in the prevention of post-traumatic neurodystrophic syndrome in the early stages. This was achieved by the following methods.

A 2% solution of lidocaine (15-20 ml) was injected into the fracture hematoma, and reduction was performed no earlier than 5 minutes later. The non-steroidal anti-inflammatory drug was used (intramuscular injection of Dexalgin® 15-20 minutes before reduction). Subsequently, in the acute period (up to 3-7 days), patients received Dexalgin® in tablet form. The choice of drug was due to the following reasons. It is one of the most optimal drugs in the NSAID class - it has a high safety profile, especially in elderly patients; strong analgesic and anti-inflammatory effects.

Adjunctive therapy included the use of Ca and vitamin D3 preparations (CaD3 Nikomed, 1 tablet twice a day for 30 days), B vitamins (Neurobion, Duovit), alpha-

lipoic acid antioxidants or Actovegin. The use of the polypeptide Keltican was a mandatory component. The drug, containing cytidine monophosphate and uridine monophosphate, is indicated for the treatment of neuropathic pain in peripheral nervous system damage. It improves axonal and neuronal regeneration. It was taken 1 t 3 times a day for 2-3 weeks. Prolonged, damped, vertical traction of the fragments was performed with increasing force.

Traction did not cause painful sensations and was rated by patients at 3.8 ± 0.09 points on the VAS scale (pain that is easily tolerated). No rough manipulations were performed. After aligning the fragments in a position of slight stretching and slight flexion or extension of the wrist, the fragments were fixed with plastic bandages. After 2 weeks, if necessary, the wrist was gradually brought to a neutral physiological position. After 4-6 weeks, following Ro-control, the bandage was removed and further active restorative treatment was carried out. A short bandage with Scotch tape to the metacarpophalangeal joints holds the fracture of the distal metaphysis of the radius well and allows movement of the fingers from the first day. On the second day after the injury, patients began physical therapy of the fingers in 1 period, and physiotherapy procedures were performed, including UHF and magnetotherapy.

Results obtained and their discussion.

In all 63 patients, a neuropathic component of pain syndrome was determined upon admission based on VAS scores. The vast majority of victims (48 - 76.1%) rated the repositioning of fragments as painless, and only 15 (23.9%) reported unpleasant sensations (4.3 ± 0.21 points on the VAS - moderate pain). Within 4 days after admission, the victims noted a decrease in pain intensity from 7.42 ± 0.31 to 2.4 ± 0.12 points on days 7 and 14 according to the VAS (satisfactory pain tolerance). The same indicators remained until the end of immobilisation. We believe that these results were achieved through multimodal analgesia using Dexalgin®. The results of treatment of 63 patients were evaluated dynamically up to 30 days after injury. After rehabilitation treatment, 52-82.5% of patients rated their pain as minor and tolerable (2.4 ± 0.24 points). In 9-7.5% of patients, the pain syndrome became chronic (5.2 ±

0.6 points). There were contractures of the fingers and radiocarpal joint. Significant neuropathic pain syndrome persisted. Two patients had pronounced neurotrophic and functional disorders, which subsequently required long-term conservative treatment.

When patients were surveyed using the DASH scale, the function of the injured arm was determined to be satisfactory (33.2 ± 0.41 points) in 52 (82.5%) of the victims, sufficient for self-care without heavy physical exertion. In 2 (3.2%) there were pronounced neurotrophic and functional disorders - the result was unsatisfactory.

Conclusions.

1. In all observations during the first three days in all cases of FDME of the radius, the pain syndrome was neuropathic in nature.

2. The proposed multimodal analgesia with Dexalgin® in patients with FDME of the radius at the early outpatient stage was justified and effective.

3. Fifty-two patients (82.5%) highly rated the results of treatment, describing pain as tolerable and the function of the injured arm as satisfactory, with a score of 33.2± 0.4 on the DASH scale.

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Economic sciences

FOREIGN EXPANSION STRATEGIES OF POLISH SMEs IN THE CONTEXT OF NEARSHORING AND SUPPLY CHAIN RECONFIGURATION

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Abstract. *This study examines the foreign expansion strategies of Polish small and medium-sized enterprises (SMEs) in the context of nearshoring, supply chain reconfiguration, digitalisation and growing uncertainty in international trade. The main research problem concerns the forms and strategic orientations that can strengthen the ability of Polish SMEs to enter foreign markets and maintain a sustainable presence there. The research gap lies in the still insufficient integration of classical models of SME internationalisation with contemporary determinants of operational resilience, regional value chains, digital export readiness and institutional support. The aim of the article is therefore to identify the current determinants of foreign expansion strategies among Polish SMEs and to propose a*

practical model that links market selection, entry mode, operational preparation, digital readiness and support instruments. The study is based on a critical literature review, desk research and a synthesis of institutional data from PARP, Statistics Poland, the European Commission, the WTO and UNCTAD for the period 2024-2026. The analysis shows that export remains the most accessible and strategically relevant form of SME internationalisation; however, its role is changing. It is no longer only a channel for increasing sales, but also a mechanism for learning, risk diversification, strengthening customer relationships and participating in regional value chains. The findings also indicate a clear asymmetry in the internationalisation of Polish enterprises: firms are more frequently involved in international flows as importers than as active exporters. In this situation, nearshoring may create new opportunities for Polish SMEs, especially as suppliers, subcontractors and logistics partners for European companies seeking shorter and more reliable supply chains. At the same time, geographical proximity is not sufficient to ensure competitiveness. SMEs must develop operational reliability, quality assurance, contractual competences, digital communication and the ability to respond to regulatory and ESG requirements. The article contributes to the literature by combining traditional internationalisation theory with the contemporary logic of resilience and supply chain regionalisation. It also offers managerial implications by presenting a five-element recommendation model that may serve as a preliminary export-readiness audit for SMEs planning or developing foreign expansion.

Keywords. *SMEs, internationalisation, export, foreign expansion, nearshoring.*

Introduction. The internationalisation of small and medium-sized enterprises remains one of the key development processes in the contemporary economy. In an environment marked by global competition, cost pressure, shorter product life cycles and the digitalisation of business relations, even enterprises with limited capital resources are increasingly required to make decisions that extend beyond the domestic market. Foreign expansion is no longer merely a strategy for increasing

sales; it is also becoming an instrument for strengthening resilience, diversifying risk, acquiring knowledge and participating in international value chains.

The starting point for this study is the assumption that the foreign expansion of SMEs should be interpreted not only as a sales-related decision, but also as an element of growth strategy, resilience building and competitive advantage development. The literature emphasises that, because of their limited capital and organisational resources, SMEs most often begin internationalisation through less resource-intensive forms, especially export [5; 22; 24]. Today, this thesis must be complemented by factors that strongly shape strategic decisions: selective deglobalisation, geopolitics, digital sales channels, ESG pressure, energy costs and supply chain restructuring.

The aim of this study is to identify the current determinants of foreign expansion strategies among Polish SMEs and to show how classical forms of internationalisation - indirect export, direct export, cooperation, alliances and representative offices - should be interpreted in the context of 2024-2026. The research gap concerns the absence of a sufficiently integrated approach that combines traditional foreign market-entry decisions with the new requirements of resilience, digitalisation, nearshoring and the regionalisation of supply chains.

The research problem is formulated as follows: which forms and strategic orientations can currently strengthen the capacity of Polish SMEs to maintain a sustainable presence in foreign markets? This question is developed through three more specific issues: how the role of export is changing, what role nearshoring plays, and which elements should be included in a practical model for preparing an enterprise for foreign expansion. The original contribution of this study lies in synthesising these determinants and proposing a five-element recommendation model that may serve as a preliminary export-readiness audit for SMEs.

The study combines a diagnostic approach with a synthetic review of current institutional data and academic literature. This approach makes it possible to connect strategic management with an assessment of the current conditions under which Polish enterprises conduct international business.

1. Theoretical Foundations: Internationalisation and Entry Strategies

Enterprise internationalisation refers to the process of creating and developing links with foreign markets across various areas of activity, including sales, distribution, procurement, production, financing, marketing and after-sales service. In the classical approach, this process often follows a staged pattern: a firm begins with low-commitment activities, increases control over distribution channels, develops partner relationships and, in selected cases, undertakes capital investment [5; 24].

The stage model does not fully explain the behaviour of firms operating in the digital economy, within network-based business relations and in rapidly globalising niche markets. Early-internationalising enterprises may operate internationally from the outset, particularly when they possess specialised knowledge, a niche product, technological competences or access to international networks [1; 12; 19]. For Polish SMEs, limited scale does not necessarily prevent expansion, but it requires an appropriate choice of market, partners and operating model.

The choice of entry mode into a foreign market may be understood as a decision concerning the relationship between control, risk, cost and the pace of organisational learning. Indirect export reduces risk and capital requirements, but limits contact with the final customer. Direct export increases control, but requires commercial, logistical and legal competences. Cooperation and strategic alliances make it possible to share risks and resources, whereas equity-based forms provide the highest level of control but require the greatest commitment [2].

For SMEs, the principle of strategic proportionality is particularly important. A firm should select its form of expansion not on the basis of prestige or formal advancement, but according to its ability to maintain quality, timeliness, financial liquidity and relationships with foreign customers. Export therefore remains the most important path of internationalisation, although its professionalisation requires analytical, digital, network-based and institutional support [1; 10; 15].

Table 1. Forms of Foreign Expansion of SMEs and Their Strategic Significance

Form of expansion	Level of control	Risk	Significance for SMEs
Indirect export	low	low	suitable initial stage with limited international experience
Direct export	medium	medium	enables customer relationships and brand recognition
Non-equity cooperation	medium	medium	enables sharing of costs, knowledge and distribution channels
Strategic alliance	medium/high	medium/high	strengthens position in the value chain and enables a joint offer
Foreign branch or investment	high	high	requires capital, but increases market and service control

Source: own elaboration based on [1; 2; 5; 10; 15; 22; 24].

The table shows that the optimal entry mode should not be equated with the highest possible level of control, but with the alignment of risk and commitment with the resources of the enterprise. For many SMEs, a rational path is a gradual transition from indirect export to direct export and network-based cooperation.

2. Materials and Methods

This study applies the desk research method, understood as a critical analysis of secondary sources and their synthesis with the theoretical literature on enterprise internationalisation. The analysis is not a survey-based empirical study; rather, it is a diagnostic and practice-oriented study. The procedure included three stages: identification of key theoretical approaches to SME internationalisation, analysis of current institutional data and synthesis of conclusions in the form of a decision-making model for enterprises.

The selection of sources was guided by the criteria of timeliness, comparability, institutional credibility and diagnostic usefulness. The analysis focuses primarily on data from 2024-2026, as this period best reflects contemporary operating conditions: logistical disruptions, cost pressure, geopolitical shifts, the digitalisation of B2B sales and the growing importance of supply chain resilience.

The analysis draws on the PARP 2026 report, Statistics Poland data on foreign trade and enterprise innovation, the European Commission report on SMEs 2024/2025, and WTO and UNCTAD studies on world trade, investment and value chains [3; 6; 7; 8; 20; 25; 26]. This made it possible to capture both the microeconomic dimension of enterprise-level decisions and the macroeconomic dimension of changing trade and investment flows. The scope of inference is diagnostic and practice-oriented; deeper verification of the proposed model would require complementary primary research among exporters and potential exporters.

Table 2. Current Data Sources Used in the Analysis

Source	Scope of information	Significance for the article
PARP 2026	number of firms, SME structure, exporters and importers	diagnosis of the SME sector and degree of internationalisation
Statistics Poland 2025/2026	foreign trade, innovation, non-financial enterprises	verification of the current macroeconomic context
European Commission 2025	SMEs in the EU, value added, employment	comparison of Poland with the European environment
WTO 2025	world trade forecasts and trade policy pressure	assessment of external conditions for expansion
UNCTAD 2025	FDI, reconfiguration of production and supply chains	interpretation of nearshoring and diversification

Source: own elaboration based on [3; 6; 7; 8; 9; 20; 25; 26].

The combination of sources reduces the risk of one-sided interpretation because it integrates national, European and global data. As a result, the study interprets internationalisation as a strategic decision shaped by the enterprise's position in the supply network, level of digitalisation, operational resilience and access to support instruments.

3. The Current Context of the SME Sector in Poland and the European Union

The importance of SMEs for the European economy remains fundamental. According to the European Commission, SMEs account for 99.8% of enterprises in

the non-financial business economy of the European Union. In 2024, this sector recorded a slight decline in real value added, but at the same time an increase in employment, while forecasts for 2025 indicated a recovery in value-added dynamics and further employment growth [3]. SMEs therefore act as a stabiliser of the economy, while remaining highly sensitive to volatility in costs, demand and regulation.

In Poland, the structure of the enterprise sector is similar. The PARP 2026 report indicates that in 2024 there were 2.37 million active non-financial enterprises, of which 99.8% were SMEs. The largest group consisted of microenterprises: 97.2% of the enterprise population, or approximately 2.3 million entities. Small enterprises accounted for 2.0%, medium-sized enterprises for 0.6%, and large enterprises for 0.2% [20]. Such dominance of microenterprises has important implications for internationalisation: most entities operate with limited capital, limited staff specialisation and a relatively low capacity to absorb foreign-market risk.

This does not mean that expansion potential is absent. Small scale may support flexibility, specialisation and rapid adaptation of the offer. The main challenge is the transition from occasional export to a sustainable international strategy, which requires market recognition, quality control, financing of the delivery cycle, management of exchange-rate and contractual risk, and communication competences. Professional and managerial competences are also important, as expansion depends not only on financial resources but also on the alignment of employee qualifications with market requirements [13].

The data confirm that Poland has broad but highly dispersed internationalisation potential. The dominance of microenterprises means that instruments supporting expansion should be simple, modular and adapted to the limited organisational capacity of firms.

Table 3. Selected Indicators of the SME Sector in Poland and the EU

Indicator	Value	Strategic interpretation
Share of SMEs in EU enterprises	99.8%	SMEs constitute the basic structure of the European economy
Number of active enterprises in Poland in 2024	2.37 million	broad base of potential entities for expansion
Share of SMEs in the enterprise population in Poland	99.8%	export policy must be adapted to small-scale firms
Share of microenterprises in Poland	97.2%	main constraint is limited capital, time and competences
Number of microenterprises in Poland	approx. 2.3 million	internationalisation potential requires selection and support

Source: own elaboration based on [3; 20].

4. Current Indicators of the Internationalisation of Polish Enterprises

Current data confirm that internationalisation is not distributed evenly across the entire SME population. According to PARP, the number of goods exporters amounted to 107.2 thousand, representing 4.5% of enterprises, while the number of service exporters amounted to 18.4 thousand, or 0.8% of firms. Import activity was more widespread: 264.5 thousand enterprises imported goods, and 26.8 thousand imported services [20]. These data indicate that Polish firms are more frequently involved in international flows as buyers than as active sellers in foreign markets.

This asymmetry is strategically important. Import may serve as a learning stage, enabling firms to understand foreign markets, build supplier relationships and become familiar with quality standards. By itself, however, it does not create the same competitive advantage as active export sales. For SMEs, the key challenge is to move from passive participation in international flows to an active expansion strategy that includes market segmentation, a value proposition, pricing policy, customer service and risk management.

Macroeconomic data also show that Polish foreign trade remains significant, but sensitive to changes in the economic environment. In January-December 2025,

goods exports amounted to PLN 1,553.5 billion, while imports amounted to PLN 1,579.7 billion, resulting in a negative balance of PLN 26.3 billion. Exports increased by 2.0% year on year, whereas imports increased by 3.9% [8]. In January 2026, exports reached PLN 120.6 billion, imports PLN 117.8 billion, and the balance was positive at PLN 2.8 billion, although both exports and imports were lower than a year earlier [9].

For SME strategy, the key issue is not only the level of trade turnover, but also the volatility of operating conditions. Enterprises should develop expansion scenarios that take into account declining demand, exchange-rate fluctuations, tariff changes, transport costs and delivery times. SME flexibility may become an advantage, but only when supported by management information and financial discipline.

Table 4. Current Measures of Enterprise Internationalisation in Poland

Measure	Value	Significance for SME strategy
Number of goods exporters	107.2 thousand	export is concentrated in a relatively small group of firms
Share of goods exporters	4.5%	most firms do not conduct active foreign sales
Number of service exporters	18.4 thousand	services have growth potential, but require digital competences
Number of goods importers	264.5 thousand	import is a broader form of contact with foreign markets
Share of goods importers	11.1%	supply chains are more internationalised than sales

Source: own elaboration based on [20].

The most important conclusion is the asymmetry of internationalisation: Polish enterprises participate in foreign markets more often as importers than as exporters. Development therefore requires a shift from purchasing-based international involvement to active sales and relationships with foreign customers.

Table 5. Polish Foreign Trade - Selected Data for 2025/2026

Period	Exports	Imports	Balance	Conclusion
January-December 2025	PLN 1,553.5 billion	PLN 1,579.7 billion	PLN -26.3 billion	imports grew faster than exports
2025/2024 dynamics	+2.0%	+3.9%	deterioration	competitive and cost pressure
January 2026	PLN 120.6 billion	PLN 117.8 billion	PLN +2.8 billion	short-term improvement
January 2026/2025 dynamics	-5.9%	-9.3%	positive balance	year-on-year decline in turnover

Source: own elaboration based on [8; 9].

The volatility of trade data indicates that SME export strategy should include alternative courses of action for different scenarios. Monitoring transport costs, exchange rates, payment terms and regulatory changes becomes particularly important [14].

5. Nearshoring, Digitalisation and Resilience as New Determinants of Expansion

The contemporary foreign expansion of SMEs cannot be analysed solely through the classical lens of market selection. The configuration of value chains has become a central strategic issue. The pandemic, geopolitical tensions, the war in Ukraine, rising energy costs and state industrial policies have led enterprises to reassess the length, stability and vulnerability of their supply chains. UNCTAD emphasises that trade tensions, industrial policies and changing supply chain strategies affect investment decisions and production structures [25]. Similar conclusions emerge from the literature on global value chains and supply-network resilience, which stresses coordination, flexibility and rapid reconfiguration [4; 16].

In this context, nearshoring is becoming an important element of enterprise strategy. It does not represent a simple retreat from globalisation; rather, it involves

shifting selected functions closer to target markets in order to reduce the risk of delays, improve quality control, lower logistics costs and shorten response times to orders. Pierzchlewski and Węgrzyn indicate that interest in nearshoring industrial production from China results from rising labour costs, geopolitical changes, the need to increase supply chain flexibility and pressure for sustainable development [23].

For Polish SMEs, nearshoring may represent both an opportunity and a challenge. The opportunity lies in becoming suppliers, subcontractors, logistics partners or specialised manufacturers for European firms seeking closer sources of supply. The challenge lies in meeting quality, timeliness, environmental and digital standards. Geographical proximity alone is insufficient if a firm lacks the capacity to process orders continuously, maintain data transparency and communicate in real time.

Nearshoring should therefore be understood in two directions. First, it may increase the sales opportunities of Polish SMEs by enabling them to become geographically closer suppliers for European customers. Second, it may function as a procurement strategy for SMEs themselves, based on shortening their own supply chains, reducing dependence on distant markets and building more stable relationships with regional partners.

Digitalisation is the second determinant. B2B platforms, e-commerce, CRM systems, marketing automation and data analytics reduce the barrier to initial entry into foreign markets. They do not eliminate the need for strategy; rather, they increase the importance of channel selection, reputation management, data security and after-sales support. In foreign expansion, digitalisation should support demand analysis, communication, logistics, payment processes, quality control and scaling under conditions of limited resources [10; 17; 18].

These determinants operate jointly rather than separately. Nearshoring without digitalisation and quality standards may remain an unused opportunity, whereas digitalisation without operational resilience does not guarantee a sustainable presence in foreign markets.

Table 6. New Determinants of SME Foreign Expansion

Determinant	Mechanism of influence	Managerial implication
Nearshoring	shortening supply chains and shifting production closer to the market	building an offer for European partners and customers
Digitalisation	reducing costs of communication, sales and market analysis	developing B2B, CRM, e-commerce and data analytics competences
Operational resilience	maintaining deliveries despite external shocks	diversifying suppliers, markets and logistics channels
ESG regulations	increasing environmental and reporting requirements	monitoring carbon footprint, certification and transparency
Trade policy	volatility of tariffs, sanctions and administrative barriers	legal monitoring and scenario-based planning

Source: own elaboration based on [4; 11; 16; 17; 23; 25; 26].

6. A Recommendation Model for SME Expansion Strategy

On the basis of the analysis conducted, a five-element recommendation model can be proposed for Polish SMEs planning or developing foreign expansion. The model does not replace a detailed enterprise strategy; rather, it organises the key decisions that should precede entry into a foreign market. Its value lies in combining market, operational, digital and institutional perspectives - areas that are often analysed separately in practice.

The first element is market selection. SMEs should assess not only the size of demand, but also administrative barriers, payment stability, logistics costs, business culture, technical requirements, competition and the possibility of after-sales service. For firms with limited resources, it may be more rational to enter a geographically closer but better-understood market than a formally larger market with high adaptation costs.

The second element is the choice of entry mode. Indirect export may be appropriate for firms beginning international activity, whereas direct export should be developed where the enterprise seeks to build its brand and relationships. Cooperation and alliances are particularly important in the context of nearshoring

because they allow firms to join regional supply chains without immediately incurring the costs of equity investment.

The third element is operational preparation. A firm should assess whether it can maintain timeliness, quality, financial liquidity and communication with foreign customers. In foreign expansion, the cost of error is usually higher than in the domestic market because it may include loss of credibility, transport costs, exchange-rate risk and potential legal disputes.

The fourth element is digital readiness. This includes not only a website in a foreign language, but also a professional presentation of the offer, a structured product-data catalogue, rapid contact options, relationship management systems, information security and opinion monitoring. The fifth element is institutional support, including export-promotion instruments, advisory services, trade-fair programmes, market information and contact networks. Such support does not replace strategy, but it may reduce the cost of initial entry and limit the risk of incorrect decisions.

Table 7. Recommendation Model of SME Expansion Strategy

Stage	Key question	Expected result
1. Market selection	Is the market attractive and serviceable?	market aligned with the firm's resources
2. Entry mode	What level of control and risk is acceptable?	selection of export, cooperation or partnership
3. Operational preparation	Can the firm maintain quality, deadlines and liquidity?	realistic delivery and customer-service plan
4. Digital readiness	Is the firm credible and accessible digitally?	consistent B2B presence and efficient communication
5. Institutional support	How can information and entry costs be reduced?	use of programmes, trade fairs and networks

Source: own elaboration.

The model is sequential in structure, but in practice it requires feedback loops. A negative assessment of operational or digital readiness should lead to a revision of the selected market, entry mode or pace of expansion.

7. Discussion

A comparison of theoretical insights and current data leads to the conclusion that export remains the most important and most accessible form of SME internationalisation; however, it should not be treated as a simple form of expansion. Contemporary export requires far greater professionalisation than in the previous decade, because foreign competition increasingly takes place at the level of network relationships, organisational capabilities and operational efficiency [1; 11; 15]. It includes data analysis, management of digital channels, certification, logistics, multilingual service and transaction security.

Current data confirm that export remains a fundamental, yet still selective, form of SME internationalisation. Only a small percentage of enterprises actively sell goods abroad [20]. The principal strategic problem is therefore not merely the choice between indirect export, direct export and cooperative forms, but the need to increase the number of firms capable of a systematic and professional presence in foreign markets. In practice, this requires the development of analytical, logistical, digital, financial and contractual competences.

The new role of nearshoring lies in its potential to increase the importance of SMEs as participants in regional production and supply networks. Poland, as a country located close to the main markets of the European Union, may benefit from the shortening of value chains. This benefit, however, depends on whether enterprises are able to meet standards that were previously required mainly from large suppliers: predictability, quality, timeliness, regulatory compliance and data transparency.

From the perspective of economic policy, support for SME expansion should move away from general export promotion towards export-readiness diagnosis, contractual advisory services, certification support, digitalisation of sales, the creation of export consortia and the linking of firms with European supply chains. From a managerial perspective, five actions should precede expansion: market assessment, selection of entry mode, operational audit, preparation of a digital B2B offer and protection against payment, logistics and legal risks [11; 21; 22]. The competences of managers and employees responsible for international contacts are particularly

important, as a mismatch between competences and market needs may limit a firm's ability to serve foreign partners professionally [13; 14].

8. Conclusions

First, the contemporary foreign expansion of Polish SMEs takes place in an environment of greater uncertainty, cost pressure and stronger dependence on the quality of supply chains. The analysis of current data from 2024-2026 indicates that any assessment of internationalisation strategies must take into account digitalisation, operational resilience, ESG, geopolitics and nearshoring.

Second, export remains the basic form of SME internationalisation, but its strategic content has expanded. It is no longer solely a way to increase sales, but also an instrument of learning, risk diversification, brand strengthening and participation in value chains. The greatest challenge remains the transition from incidental export to a sustainable presence in foreign markets.

Third, nearshoring may create new opportunities for Polish SMEs, especially in manufacturing, business services, logistics and specialised industrial niches. Taking advantage of this opportunity requires operational, digital and quality-related competences, as well as the ability to cooperate within network-based arrangements.

Fourth, the recommended SME expansion strategy should cover five interconnected areas: market selection, entry mode, operational preparation, digital readiness and institutional support. Only such an approach makes it possible to link development ambitions with the real resources of the enterprise and to reduce the risk of entering a market that the firm is unable to serve in terms of quality, finance or logistics.

Further research should include a nationwide survey of exporting enterprises and potential exporters, with a separate module on nearshoring, digitalisation, regulatory barriers, expansion financing and supply chain resilience. This would make it possible to identify support needs more precisely and to assess which competences most strongly increase the likelihood of maintaining a sustainable presence in foreign markets.

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