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DEVELOPING CRITICAL AND LOGICAL THINKING SKILLS FOR BANKING PROFESSIONALS: CHALLENGES OF THE INFORMATION AGE

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Abstract. The modern era of digital transformation and information overload (Industry 4.0 and Industry 5.0) creates unprecedented challenges for banking sector professionals. The exponential growth of information volumes, spread of misinformation (manipulation), increasing complexity of financial instruments, and high level of market regulation demand that banking professionals develop strong critical and logical thinking skills. This study analyses key risks in the modern educational process for banking, including information overload, declining ability for deep analysis, and vulnerability to manipulative techniques. The systematic development of critical and logical thinking skills is essentially a strategic imperative for financial organizations and the government institutions that regulate them. A possible response (though not a panacea) could be implementing a comprehensive methodology for developing critical thinking, including practical tools for information verification, logical analysis techniques, and protection against cognitive biases. Special attention should be paid to specific risks in the banking sector related to making financial decisions under conditions of uncertainty and information asymmetry.

Key words: critical thinking, logical thinking, banking education, information security, misinformation, financial risks, cognitive biases.

"The illiterate of the 21st century will not be those who cannot read and write,
but those who cannot learn, unlearn, and relearn."
Alvin Toffler

Introduction. Modern banking business is experiencing a period of fundamental changes driven by digital transformation, changing consumer behaviour, and growing complexity of financial products. According to McKinsey Global Institute research, the volume of data in the global economy doubles every two years, with 90% of all data created in the last two years [1]. For banking professionals, this means the need to process and analyse unprecedented volumes of information when making critically important decisions.

Alongside the growth of information flows, we observe a general degradation in information quality. Research by the Reuters Institute shows that 38% of respondents avoid news because of its negative impact on their mood, while 43% believe they cannot distinguish reliable information from unreliable [2]. The latter has been defined by Tom Nichols as the phenomenon of "the death of expertise," when people having nothing to do with either professional knowledge or expert qualifications gained access to expert platforms through the internet and social networks [3]. This "militant ignorance" can provide answers to any question and explain any ongoing processes in primitive, everyday (but therefore understandable and accessible, and consequently popular for the masses) terms. Gone are the days of science popularisers like Stephen Hawking, Sergey Kapitsa, and other prominent scientists. Their places are occupied by numerous bloggers, “experts”, often lacking proper education or practical work experience, but getting media presence. The scientific approach has been replaced by "hype," "reels," and fragmented, non-systematic information, which is presented to both common people and professionals as practical knowledge.

The digital rhythm of life set by the 4th Industrial Revolution (Industry 4.0) has led to a specialized process of information perception, especially among the so-called "digital natives" – Generations Z and Y. This means a significant reduction in attention and the tendency towards so-called "clip thinking." First and foremost, more and more attention is being transferred to visual information processing. The length of video frames in this situation is a good criterion for evaluating the changes that have occurred. According to experts, Generation X and Baby Boomers could comfortably perceive a "frame" lasting 25 seconds or longer – just recall the films from the middle and end of the last century that became classics. And what about films by masters like Andrei Tarkovsky, where the "frame length" seems endless? Generation Y on average concentrates their attention for 12 seconds, while for Generation Z this indicator is already eight seconds [4].

The term "clip thinking" (or "clip consciousness") is used to describe the peculiarities of perception and information processing in the digital environment: when a person, within their work information flow or at home, encounters a stream of short, fragmented messages (posts, stories, videos up to a minute, etc.). In his work "The Third Wave," Alvin Toffler defined such content as "clip culture," namely – a mosaic of disconnected visual and emotional fragments, its brightness and short duration, quick replacement by others; illogical, disjointed, fragmentary information, dissolution of its holistic models [5].

The most dangerous risks of clip thinking for intellectual work include:

1. Superficial information perception. The ability to deeply analyse, compare, and synthesize information decreases.
2. Weakening of logical and critical thinking. Due to fragmented perception, the ability to build cause-and-effect relationships and reach conclusions based on them significantly deteriorates.
3. Decline in concentration. It becomes harder and harder for professionals to focus on one subject or text; a habit of constant "switching" develops.
4. Loss of linear reading and writing skills (the habit of "Z-reading"). It becomes more difficult for professionals to absorb long texts, arguments, and narratives.
5. Emotional superficiality. Reaction to perceived information is impulsive, with the effect of "instant impression," but without meaningful understanding.
6. Dependence on external stimulation. A person develops "information addiction" – a constant need for new emotional stimuli (clips, notifications).

Separately, we should consider the effect of "Z-reading" (different from the standard Z-shaped eye movement across text) formed by clip perception of information. This is the loss of sequence and depth in reading, where a person's eyes catch individual bright elements, such as headlines or images, almost completely ignoring the main part of the text.

Characteristics of "Z-reading" include:

1. Fragmentation, when a person perceives separate parts of text (headlines, highlighted words, visual images and videos).
2. Lack of sequence – a person does not strive for logical construction of thought from what they read, skipping entire sentences and paragraphs.
3. Superficiality – attention is focused on external form rather than content, analysis, or critical reflection on information.
4. Speed and impulsivity: constant change of stimuli occurs, excluding the possibility of deep immersion in material.
5. Habit of short content formed by clip thinking (information from social networks, YouTube, Internet), where short-term videos and posts predominate. This trains the brain to perceive information in the form of separate, bright "clips."
6. Low concentration, when the ability for prolonged attention focus decreases, making full reading difficult and burdensome.

7. Superficial analysis, when a person is increasingly incapable of deep analysis due to the habit of instant, superficial data processing.

Of course, existing research also provides positive characteristics of clip thinking, explaining that this is not a disease (degradation) but a kind of adaptive reaction of new generations to the world of digital technologies and the colossal information flow of Industries 4.0 and 5.0. This is a protective brain reaction that filters excessive data, focusing on key moments [6].

Positive characteristics typically include skills in rapid information processing, adaptation to the digital environment, multitasking, improved visual perception, emotional engagement, flexible thinking (easy adaptation to new forms of information presentation), and time savings. However, these same researchers agree that such adaptation still negatively affects concentration, impairs long-term memory, and influences cognitive skills of analysis and critical thinking.

The world of "clip thinking" forms a stable and favourable environment of "fragmented knowledge" and a "mosaic-fragmentary world," in which, according to French sociologist Abraham Moles, people live with "fragmented consciousness": "A series of emotionally saturated images does not allow for the formation of a complete picture of the world. Thus, modern postmodern culture forms individuals with split consciousness, incapable of systematic thinking" [7].

Philosopher Sergey Kara-Murza points out that the more a person is involved in the world of mosaic culture, the smaller the role logic plays and the more susceptible consciousness becomes to manipulation [8].

All these aspects are increasingly manifesting in the training of specialists, whether in specialized secondary education or higher education. It should be noted that existing standard – generally accepted education is still full of traditional approaches and is dogmatic, with emphasis still placed on memorizing procedures and regulatory requirements, rote learning, paying almost no attention to developing analytical abilities. This is an additional trauma for representatives of new generations who have already absorbed the approaches of the clip thinking world: the boring nature of the information and subjects being presented creates no motivation to study and analyse, but to solve the problem for the quickest as "Z-reading": quick work with digital information sources (for example, Wikipedia) without investing time in deep study. Operating with information, but not forming stable – systematic knowledge and skills – often such knowledge (and the students themselves) are called "Wikipedia-based" or "Instagram-based." Surveys conducted among students show that for 80% of students, Wikipedia is the priority source when searching for information [9].

A significant number of students read summaries of textbooks or literary works, study reviews from bloggers and journalists, thereby adding to the "mosaic" in their own knowledge system. Opponents of negative assessments point out that despite all this, students are capable of being multitasking: parallel to "studying" textbooks, they actively communicate on social networks, watch video content, and much more.

But such a rhythm creates the effect of information overload and, as a consequence, cognitive distortions, when students essentially have no time left for full-scale study. They don't read additional literature, remaining within the circle of "Wikipedia knowledge," and even here not everyone knows how to work correctly with information, analysing details and investigating root causes.

Obviously, all the difficulties listed above are fully present both in university education (training specialists in the financial sphere) and in training within specialized programs. Traditional approaches to banking education establish systematic vulnerabilities:

1. Focus on memorizing procedures – a significant part of the educational process is devoted to studying instructions and procedures, while insufficient attention is paid to developing analytical skills.

2. Lack of critical analysis practice – during the educational process, students are practically not taught actions in ambiguous situations requiring independent analysis and decision-making under conditions of uncertainty and limited time resources.

3. Ignoring behavioral aspects – traditional banking education is based on theories assuming market participant rationality, which showed its failure during the 2007-2008 crisis.

4. Fragmentation of knowledge – training occurs in separate disciplines without forming a holistic understanding of interconnections in the financial ecosystem. A specialist may possess expert-level knowledge of regulatory requirements but not understand their economic logic.

Then a specialist with such habits and "fragmented knowledge" enters the workplace. As a result, specialists become vulnerable to information manipulation, cognitive biases, and are unable to effectively identify and filter critically important information and data in the general information flow.

Basic Theoretical and Practical Provisions. Modern banking business faces a fundamental contradiction defining the paradox of Industry 4.0 and 5.0: as access to information becomes practically unlimited, a person's ability to meaningfully process this information becomes a critical and rare resource. This paradox manifests daily in the professional activities of banking experts, exacerbated by specific risks of banking business, among which I would like to highlight three:

1. Regulatory risks and information asymmetry
2. Technological risks
3. Market risks under conditions of information uncertainty

Banking (financial) business is historically characterized by a high degree of regulation, carrying specific information challenges. Firstly, the complexity of the regulatory environment and requirements itself: financial institutions must comply with the requirements of multiple regulators at national and international levels. Experts are forced to navigate regulatory documents of unprecedented complexity and volume: for example, the Basel III document contains more than 300 pages, and MiFID II regulatory requirements include about 1,400 pages of executive regulations [10, 11]. Secondly, the requirements themselves are constantly changing, which requires experts to quickly study and adapt changes to the bank's rhythm of work and business processes.

Besides, information asymmetry between regulators and financial institutions: regulators do not always have complete information about market practices, which often leads to the creation of ineffective, delayed, or contradictory requirements.

Technological risks, due to the active digital transformation of banking business, act as creators of new types of information risks for banks and banking experts.

Cybersecurity and digital fraud risks. Obviously, the development of digital technologies creates new opportunities for fraud. According to various estimates, due to the high professional level of training of digital criminals and the technologies used by frauds, this "industry" is becoming one of the most advanced, second only to the economies of China and the USA [12]. Banking experts are required to be able to recognize signs of fraud and critically comprehend information from clients (while clients are not ready to “waste” time on verification procedures).

According to IBM, the average cost of a data breach in the financial sector is 5.85 million USD [13].

It is worth noting the growth over the past couple of years of algorithmic risks, the use of artificial intelligence and machine learning, as a result of which risks arise related to the opacity of decision-making algorithms. Banking experts bear responsibility for understanding the limitations of automated systems and the ability to critically evaluate their recommendations and assess their potential consequences.

At the same time, due to professional activities, experts must analyse market data in real time, client portfolios, macroeconomic forecasts, and emerging risks. This occurs under quite strict time restrictions that do not allow for prolonged deliberation or comprehensive analysis.

This is aggravated by market risks. Financial market volatility is significantly amplified by the spread of information through social networks and messengers (speed and mass reach in terms of users, its reliability). As examples of such risks, we can point to the 2021 events with the price jump of American video game retailer GameStop, when coordinated actions on social networks influenced

the stock price, thereby creating systemic risks [14]. In a certain sense (the influence of information flows in social networks and user reactions), a similar situation is related to the cryptocurrency token $TRUMP, which was condemned by some prominent professionals in this field [15].

High-frequency trading is already operated based on automated algorithmic protocols, with minimal human control. This again puts forward requirements for experts in understanding the principles of algorithm operation and their potential vulnerabilities.

The emerging cognitive overload of experts represents not simply an operational inconvenience but a systemic threat to the quality of decisions made by one specialist or another: in an industry where individual errors can escalate into institutional failures, which may be followed by the collapse not only of one organization but of the financial system. It is always necessary to remember that to a certain extent, clients entrust their well-being in the present and future to banking professionals and banks (pension savings, targeted projects, etc.). Responsibility and risks are always high.

Accordingly, one of the fundamental factors can be identified: information overload of specialists as a systemic risk.

The concept of information overload was first systematized by Alvin Toffler in his work "Future Shock," in which he describes psychological disorientation caused by the acceleration of changes and destruction of epistemological foundations that previously allowed professionals to effectively manage complexity [16]. The scientist showed that rapid technological and social acceleration, accompanied by avalanche-like growth of information, causes psychological disorientation and decision-making paralysis, a state he brought into the book's title: future shock. He predicted that knowledge would become the main "currency" of post-industrial society, but information excess would produce the opposite effect: a decrease in the ability to process it rationally. For banking specialists, this dynamic manifests in constant changes in market conditions, legal and regulatory financial requirements, new asset classes (such as crypto assets), technological tools, and high client expectations requiring quick, if not instant, adaptation.

In the banking context, this phenomenon (information overload) acquires special relevance. According to IBM research, banking analysts spend up to 80% of their working time searching for and verifying information, and only 20% on its analysis [17]. Excessive data flow reduces decision quality, as the analytical system is forced to transition from deep analysis to superficial scanning. The effect of premature cognitive closure emerges: the aim to make a decision before complete information analysis [18]. The current situation is complicated not only by information excess and time deficit for its processing, but also by active use of misinformation and various types of artificial manipulation: AI-generated information, "echo chambers," algorithmic filters, and other content not amenable to traditional verification.

The main manifestations of information overload in the banking sector are:

1. Quantitative overload – excessive volume of data that is physically impossible to analyse within available time resources. A modern banking analyst daily encounters hundreds of reports, thousands of transactions, and multiple information flows from various sources.
2. Qualitative overload – decreased ability for deep analysis due to the need for constant switching between different types of information.
3. Temporal overload – time deficit for quality information analysis under conditions of need for quick decisions. In high-frequency trading, decisions are made in milliseconds, which excludes the possibility of deep analysis due to technology.

We should add interconnected processes that have fundamentally influenced the cognitive landscape of banking activities, adding to the tension created by information overload:

1. Fragmentation of knowledge systems**.** If previously professionals relied on a fairly stable hierarchy of authoritative sources, today they have to deal with multiple competing interpretations without built-in and unambiguous reliability verification mechanisms. The lag of government institutions

with reactions in the form of clear norms – procedures – metrics adds its own negative aspect in terms of interpreting various data. Algorithmically amplified misinformation often receives wider distribution than expert and peer-reviewed data.

2. Loss of expert filter function**.** Digital platforms provide equal visibility for both certified specialists and self-proclaimed experts (that very moment of Tom Nichols's "death of expertise"). Professionals are forced to constantly compare competing sources, often without reliable heuristics for assessing their reliability. The problem of authenticating expertise in the digital age has acquired exceptional acuteness [3].

3. Emergence of artificial intelligence as a source of analytical falsifications. Modern AI systems that have rapidly burst into expert and scientific life create texts and analytical reviews comparable in quality to the best examples formed by human experts, but containing fabricated data, fictitious references, and false statements (which look quite creadible) [19]. Traditional data verification methods are ineffective, as they require time expenditure.

An additional influencing factor creating significant risks for banking business is misinformation and its impact on financial decisions.

The spread of misinformation in the financial sphere has acquired a systemic character. Oxford University research identified 70 countries where government or political structures actively use social media to spread misinformation [20]. In the financial sector, such practices can lead to artificially created panic, asset price manipulation, and market destabilization.

Types of misinformation in the banking sector:

1. Manipulative information – facts falsification with the goal of influencing decision-making. For example, spreading false information about the financial condition of competitors or intentional distortion of macroeconomic indicators.

2. Selective information presentation – highlighting only part of the information that supports a certain point of view. This is especially dangerous when analysing investment projects, where silence about risks can lead to wrong decisions.

3. Emotional manipulation–using emotional triggers to suppress rational analysis. In banking practice, this can manifest when selling high-risk products to clients unable to adequately assess risks.

Particularly, we should analyse the factor of cognitive biases in banking activities. Behavioural economics has identified many cognitive biases that influence financial decision-making. Researchers Daniel Kahneman and Amos Tversky in their works define stable cognitive biases as regular deviations of human judgment from the rational model [21]. The authors showed that in the process of evaluating information, people resort to heuristics – simplified rules that speed up problem-solving but lead to systematic errors.

For banking professionals, the most critical are:

1. Confirmation Bias – the tendency to seek, interpret, and remember information in a way that confirms already existing beliefs or hypotheses. In banking analysis, this can lead to ignoring negative signals about a borrower if the initial assessment was positive.

2. Anchoring Effect – excessive dependence on the first information received when making decisions (manager's opinion, analytical information about the initial asset price, etc.). When assessing creditworthiness, initial information about client income can unjustifiably influence the final decision, even if subsequent data disproves it.

3. Clustering Illusion – the tendency to see patterns in random data. In trading operations, this can lead to building investment strategies based on false correlations.

4. Overconfidence Effect – overestimating one's own abilities and knowledge. In banking, this can lead to underestimating risks and making excessively aggressive decisions. A striking example is research showing that 93% of drivers consider themselves better than average, which is statistically impossible [22].

Complementary (or aggravating) factors in cognitive biases are cognitive limitations researched by John Sweller, who formulated the theory of cognitive load [23]. According to this theory, human working memory can only process a limited number of information elements. J. Sweller identified three types of cognitive load:

1. Intrinsic – determined by material complexity
2. Extraneous – related to unsuccessful methods of information presentation
3. Germane – directed at forming cognitive schemas and automating thinking

As already examined, in the banking system, intrinsic cognitive load is initially high: financial and legal regulations, mathematical evaluation models possess an extremely complex structure. Additional load sources: poorly organized databases, cumbersome reporting forms, critical time deficit – sharply reduce cognitive resources available for meaningful analysis and decision-making.

Research confirms: cognitive load leads to decreased decision quality, increased errors, and strengthened dependence on heuristic strategies [24]. In banking business, this manifests in choosing simplified but inaccurate behavioural models, which again increases the probability of erroneous investments and inadequate risk assessment. For representatives of regulatory bodies (including intra-bank committees), this problem has an important consequence: when executors' cognitive capabilities are exceeded, even formally correct procedure compliance turns into routine "box-ticking" without real understanding, which undermines the very essence of regulatory control.

As the crisis of 2007-2008 showed, critical situations with banks in the USA in 2022-2023, the crisis of brands like Credit Suisse – all these are individual errors multiplied by exceeding cognitive limitations that received institutional distribution [25].

Moreover, professional experience itself does not guarantee immunity from such biases: experts are often subject to them even more seriously, especially considering pressure and limited time resources [26]. This emphasizes once again the urgency of the problem and the necessity of training targeted at studying methods of recognizing and compensating for cognitive errors.

Even with a high level of professional training, the mentioned problems of life in the digital world of Industry 4.0 and emerging Industry 5.0 prove difficult to overcome, as there is a deficit of basic cognitive skills ensuring the ability for systematic thinking. Thus, another significant factor manifests: the deficit of logical education.

Logic, once a mandatory component even of ordinary secondary education in schools in the mid-20th century, including teaching the four classical laws of thought (identity, non-contradiction, excluded middle, and sufficient reason), the structure of argumentation, and recognition of logical errors, has practically disappeared from educational programs over recent decades [27].

As researchers show, this change was not the result of someone's insidious intrigues or malicious intent: it reflected a shift in educational priorities toward applied disciplines and narrow professional competencies. This seemed correct at the time.

An even greater shift toward narrow specialization occurred in the 1990s, when against the backdrop of the bipolar world's collapse, globalization and, as a consequence, unification were prized.

However, the consequences of such specialization and the transformations of recent decades in general (including the "digital boom") proved significant. Most banking experts enter the profession without systematic training in logical analysis: they are not trained in methods of argument evaluation; are not familiar with the typology of logical errors; and do not possess formal tools for checking reasoning.

The assumption that a professional with university education by definition possesses basic logical culture is, unfortunately, deeply mistaken. This educational deficit forms systemic vulnerabilities precisely in those areas where maximum cognitive accuracy is required (obviously, this is not limited to banking business alone). Experts without proper training in logic are more susceptible to:

1. Emotional manipulation in market communications
2. False dichotomies in strategic discussions

3. Ambiguity in interpreting regulatory documents
4. Circular reasoning in risk assessment

Experts lack tools for recognizing the substitution of evidence with rhetoric, distinguishing appeals to authority from factual arguments, and identifying cases where complexity is used to hide weak argumentation. In the context of banking business – where decisions directly affect client welfare, institutional stability, and financial system stability – these individual cognitive weaknesses become sources of systemic risks.

The solution is obvious: returning a course (or group of courses) forming logical and critical thinking skills at minimum to university and specialized education programs.

The modern understanding of critical thinking formed from several complementary intellectual traditions established by a significant number of researchers. Let us focus on several that allow us to at least briefly explore the conceptual foundations.

Robert Ennis was one of the first to propose a systematic model, defining critical thinking as "reasonable, reflective thinking focused on deciding what to believe or do" [28]. He identified twelve aspects of critical thinking, thereby laying the foundation for its teaching and assessment.

Peter Facione developed this tradition within the Delphi Report project, which united expert opinions and defined six key cognitive skills of critical thinking [29]:

1. Interpretation
2. Analysis
3. Evaluation
4. Conclusion
5. Explanation
6. Self-regulation

He also emphasized the importance of dispositions – stable personal inclinations to use these skills: curiosity, open-mindedness, honesty in acknowledging errors, flexibility, and striving for justified judgments.

Special pleasure and pride comes from the contribution of Ukrainian scholars to the study of critical and logical thinking, namely in advocating for principles of full return of teaching these skills to university education.

In his monograph "Critical Thinking," O. Tiahlo proposed a comprehensive methodology for teaching critical thinking in Universities. He emphasized the need to integrate logic and critical analysis, developed the course "Logic with Elements of Critical Thinking," included in Kharkiv Universities, and emphasized the practical orientation of logical knowledge: their application to identify manipulations and evaluate arguments in real communications [27]. His ideas were developed by A. Konverskyi, who identified four key factors in forming critical thinking: teaching methods, learning format, assessment methods, and style of cognitive activity [30]. He argued that problem-oriented methods (evidence-seeking, hypothesis-testing) most effectively develop the ability for critical judgment. He considered an important component to be creating an educational environment where systematic doubt is permitted and asking questions is encouraged – an approach especially valuable for banking education, where formal adherence to procedures and traditional conservatism often substitute for substantive analysis.

Works by M. Popovych, though not dedicated to aspects of critical thinking, directly touch on aspects of analyzing financial texts and regulatory documents. In his work "Philosophical Questions of Semantics," he laid the foundations for analyzing scientific language and knowledge structure, thereby developing principles of semantic precision and verification of scientific statements [31].

Thus, critical thinking includes both skills and the inclination to apply them. For banking experts, this means that educational programs must develop not only analytical tools but also professional values: readiness to ask questions, verify sources, reconsider conclusions, acknowledge errors. The con-

servatism, traditionalism, and hierarchical culture of most financial institutions, which highly value procedure compliance and subordination, often suppress precisely those qualities that constitute the essence of critical thinking.

A systemic solution could be developing a comprehensive theoretical-practical model designed to form critical and logical thinking competencies in banking experts working under conditions of high cognitive load, excess (and continuing growth) of information volume, and transformation of traditional models of expertise and verification.

As already shown, the general decline in quality of professional decisions in banking is not a consequence of individual incompetence but reflects structural cognitive and institutional limitations formed over recent decades.

Three levels of such limitations can be identified, to which attention should primarily be paid when building a model for forming critical and logical thinking competencies:

1. Individual-cognitive level. At this level, cognitive overload, heuristic biases, and deficit of logical-analytical training dominate.

– Inability for systematic information assessment with multiple variables;
– Dependence on authority or intuitive templates;
– Weak distinction between reliable argument and rhetorical impact;
– Influence of validity illusion and overconfidence in own judgments.

The main cause is the absence of formal cognitive self-regulation tools, which are formed through teaching logic and critical analysis.

2. Organizational-institutional level. At this level, the key factor is organizational culture oriented toward procedure compliance and error minimization rather than critical assessment of assumptions. The main problem is so-called institutional barriers (conformism, bureaucratic thinking, fear of expressing alternative opinions) that do not allow realization of critical thinking skills even for trained employees.

– Fear of expressing alternative opinions contradicting management
– Encouragement of conformism and bureaucratic thinking
– Use of reporting as a form of analysis imitation
– Absence of structures for interdisciplinary discussion of complex and controversial cases

3. System-regulatory level. At this level, the main problems are inconsistency between educational, professional, and regulatory standards.

– Banking specialist training programs are oriented predominantly toward technical knowledge rather than cognitive analysis skills.

– Certification exams assess knowledge of regulations but not the ability to critically interpret information.

– Regulatory bodies focus on formal compliance with requirements rather than cognitive quality of decisions.

Such inconsistency leads to institutional replication of cognitive weaknesses: the system of education and control unintentionally, due to already established attitudes, reproduces the same limitations it should eliminate. In summary, the interrelationship of levels can be presented in Table 1.

As seen from the table presented, the implementation of such a model will be successful only with systematic coordination of actions by the state in the form of regulatory bodies and the education system, as well as the banking system and institutions from other industries involved in this business. With coordinated interaction, transformation must be carried out at each of the three levels. For regulators, as a complex of professional competency assessment and development of educational requirements. For universities and specialized professional training programs, as a methodological base for designing courses on practical and logical thinking (economics and finance specialties). For financial institutions, as a basis for corporate programs developing analytical skills and open discussion culture.

Table 1

Interrelationship of limitation levels and directions of transformational impact within the comprehensive theoretical-practical model designed for forming critical and logical thinking competencies in banking employees

Level	Main Limitations	Key Action Directions	Target Result
Individual	Cognitive biases, absence of logical culture	Teaching logic, critical analysis, self-reflection	Improved quality of thinking
Organizational	Conformism culture, bureaucratic thinking, fear of errors and alternative opinions	Creating discussion structures, correcting incentives	Environment of cognitive autonomy
Regulatory	Formal approach to competencies, disconnection from educational practice	Introducing analytical standards and cross-industry programs	Institutional cognitive resilience

Source: author's development

At the individual-cognitive level, emphasis should be placed on developing cognitive and analytical knowledge and skills. The simplest measures appear to be:

1. Introducing mandatory logic and critical thinking courses into banking specialist training programs
2. Teaching methods of recognizing cognitive biases, argumentation analysis, and information verification
3. Using cases with cognitive error analysis–analysing specific situations where decisions were made under bias influence
4. Implementing regular self-reflection and analysis of decisions made in the corporate training process

The goal is transition from unconscious intuitive thinking to conscious cognitive self-regulation–the ability to track one's own reasoning, identify errors, and correct them.

At the organizational-cultural level, actions are needed aimed at creating an institutional environment conducive to critical thinking, namely:

1. Forming a culture of open discussion and permissibility of intellectual disagreement.
2. Creating cross-functional analytical groups (committees) where employees and management can discuss complex cases without fear of sanctions. For example, quality committees, ethics and risk management committees.
3. Implementing feedback systems allowing identification and discussion of errors as a learning tool, not punishment.
4. Developing an incentive system: increasing evaluation not for (or more precisely not only for) formal procedure execution, but for quality of analytical decisions.

Such an environment promotes development of professional autonomy and reduces thinking dependence on hierarchical pressure.

Finally, the regulatory-institutional level, which can be considered the macro-level of changes. At this level, development of logical and critical thinking should become a strategic priority of government and professional policy, within which:

1. Integration of cognitive and analytical competencies into financial sector expert certification standards
2. Revision of regulatory approaches providing for assessment of judgment quality, not just formal compliance with regulations
3. Support for inter-university and cross-industry programs for developing logical-critical skills
4. Creation of joint platforms for knowledge exchange between banks, regulators, and academic institutions

It is important to note that in the long term, precisely cognitive resilience, not exclusively technical competence, will become the key indicator of banking specialist professionalism.

Conclusion. The development of critical and logical thinking skills among banking professionals constitutes a critically important task for transforming the paradigm of professional training in the banking sector: a transition must be made from the dominance of technical and regulatory competencies to their integration with cognitive, analytical, and ethical competencies.

As has been demonstrated, the professionalism of banking specialists has traditionally been measured by the degree of mastery of financial instruments, knowledge of regulatory instructions and laws, and precision in executing procedures. However, in the context of the digital economy (Industry 4.0 and 5.0), when algorithms and digital platforms begin to perform a significant portion of routine analytical functions, it is precisely the ability to think critically, logically, and independently that becomes the determining factor of professional value.

The professional identity of the banking expert-professional must transform from a "financial process manager" to an analyst capable to reflective thinking, reasonable thinking, and intellectual responsibility.

The key conclusion is that the crisis of critical and logical thinking in the professional environment begins in the education system. Contemporary curricula in economics, finance, and management are dogmatic, oriented toward applied skills, but practically fail to develop fundamental cognitive discipline of thought. To restore such discipline, systemic reform is necessary within the framework of the proposed comprehensive theoretical-practical model, including several levels: individual, organizational, and regulatory. Without changing organizational culture and without incorporating these competencies into regulatory standards, any educational initiatives will remain fragmentary in nature.

From the perspective of possible transformations in the education system, the following points are important:

1. The reintroduction of logic and critical thinking into core curricula for finance, economics, and management specializations.
2. Integration of interdisciplinary courses combining cognitive psychology, philosophy, and professional ethics.
3. Transition from a reproductive learning model to one based on inquiry-based and problem-oriented approaches.

At the macro level, state and international regulators must regard the development of critical thinking as an integral element of financial stability. Current professional certification standards (e.g., the well-known CFA, EFPA programs, risk management programs, corporate governance programs, etc.) are focused on technical skills: risk management, reporting, compliance, yet do not include cognitive competencies of analytical judgment.

Possible reforms within the framework of the proposed model (at the regulatory level) may include:

1. Incorporation of indicators of analytical and cognitive maturity into the professional certification system.
2. Collaboration between regulators and the academic community to develop standards for cognitive quality of decisions.
3. Creation of professional development programs aimed at mastering methods of critical data analysis and argumentation.

New requirements emerge from the fundamental presence of digital technologies in everyday human life and, naturally, in the financial and banking sector. The implementation of generative artificial intelligence, the use of big data and automated analytical systems, trading robots and advisors is changing not only the forms but also the epistemology of professional knowledge. On the one hand, this has undoubtedly increased the volume of information processed and minimized human errors; on the other hand, it creates a new level of cognitive risks:

1. Automation reduces critical vigilance and creates dependency on algorithms.
2. AI models often represent "black boxes" whose decisions are difficult to verify logically.
3. Generative systems are capable of producing pseudo-scientific or unreliable analytical content of high quality.

Consequently, the contemporary expert-professional must possess the competency of technological scepticism, the ability to critically evaluate not only data but also the algorithms themselves, their assumptions, logic, and limitations. This capability becomes a new form of professional literacy, without which it is impossible to ensure the reliability of decisions in a world of digital solutions and AI.

A separate issue, practically unaddressed within the framework of the present study and requiring dedicated analysis and recommendations, is the ethical dimension of critical thinking. In the broader sense of subsequent research, this concerns the relationship to humans and to the AI algorithms created by humans.

The ability to ask questions, to doubt and verify sources is not merely an intellectual habit but, above all, a form of moral responsibility for the quality of professional decisions made and conclusions drawn. As has been demonstrated, banking business affects the interests of millions of clients and the economic stability of states' financial systems, requiring not only high technical competence but also intellectual integrity: the willingness to acknowledge uncertainty, errors, and the limitations of one's own knowledge and capabilities.

Logical and critical thinking in this context functions as an ethical filter: it ensures the maximum possible transparency of reasoning, prevents manipulation, and contributes to building trust among all levels of the proposed model (individual – society – financial institution – state). Errors of thinking here rapidly transform from the individual level to the systemic level, affecting the stability of financial institutions and public trust. Thus, the development of critical thinking should be regarded not as some optional "soft" competency, but as an ethical necessity of professional activity in the banking business.

Despite the fact that the analysis conducted within this article was carried out in the context of banking specialization, the challenges identified, the patterns revealed, and the proposed directions of work have broad (if not universal) applicability.

The phenomenon of cognitive overload, erosion of logical education, and technological dependency is observed in most spheres of professional activity, from law to public administration.

The proposed model of transformation at three fundamental levels can be considered as a high-level tool for designing professional development systems in the digital era of Industries 4.0 and 5.0. It demonstrates that the formation of a culture of logical and critical thinking is not a narrowly disciplinary task, but a strategic priority for the humanitarian and institutional development of society.

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