

An attempt to harmonize the latest measurement framework regarding labor market competence expectations in the period between 2000 and 2025

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Abstract: The aim of this study is to establish an integrated competency assessment framework capable of addressing the complex and rapidly changing demands of the 21st-century labor market. The research is based on the recognition that the traditional, rigid distinction between hard and soft competencies does not adequately reflect the adaptive performance observed in real-world work situations. Using AI-supported qualitative synthesis, the study integrates several key theoretical and empirical models, including approaches to adaptive performance, the taxonomy of soft skills, metacognitive training, and component-based skill frameworks. The result is a multi-level, layered competency model that describes the functioning of skills from foundational hard competencies through simple and complex soft skills to the metacognitive regulation level. The novelty of the model lies in its resolution of the hard–soft dichotomy and its interpretation of competencies as dynamic, context-dependent systems, thereby establishing a more flexible and theoretically coherent measurement framework.

Keywords: competency assessment, soft skills, adaptive performance, metacognition, integrated competency model

1 Introduction

Mészáros & Csiszárík-Kocsir point out [1] that objectively measuring soft skills is still difficult at present because their boundaries are blurred.

In my previous research, I examined labor market competency expectations for the period between 2000 and 2025, with a particular focus on the challenges of classifying skill expectations. Distinguishing simple (basic) from complex (higher-order) competencies is often problematic, not only because of their complexity but also due to the lack of a framework to facilitate their measurement. Based on an analysis of a corpus of 42 sources, I demonstrated that competencies are not isolated

skills, but rather multi-component systems built upon one another. Simple competencies represent well-defined, independently developable elements, while the development of complex competencies requires the integrated application of multiple basic competencies in a highly context-dependent manner. The results indicate that labor market expectations do not replace these types of competencies by time, but rather layer them, which calls into question the applicability of rigid, hierarchical competency typologies [2].

In the modern labor market, performance and adaptability are not determined solely by formal knowledge and traditional cognitive abilities. Examining the phenomenon from an economic perspective, Deming and Silliman argue [3] that human capital is a multidimensional construct in which higher-order skills—such as decision-making, collaboration, and adaptability—play an increasingly significant role in employees’ task selection and productivity, thus rendering the interpretation of the workforce as merely a “factor of production” an outdated approach. This perspective is supported by the empirical work of Colledani et al. [4], which offers a reliable measurement tool (MSSAT – Multiple Soft Skills Assessment Tool) for assessing key soft skills (interpersonal skills, communication, decision-making, integrity) in an organizational context, confirms their positive relationship with performance and well-being, and highlights that these skills are interconnected. Rahnev’s methodological review [5], meanwhile, points out that metacognition—as the foundation of self-regulated thinking and decision-making—is a measurable yet context-sensitive construct that plays a key role in learning, sound decision-making, and adaptive functioning. One of the author’s main conclusions is that there is no perfect measure of metacognition; every measurement involves compromises. However, in the long term, process-model-based approaches represent the most promising direction for understanding and measuring how metacognition works.

These studies together confirm that understanding adaptive performance requires integrated theoretical and measurement models grounded in metacognition and higher-order skills [3] [4] [5].

2 Literature review

The study by Pulakos et al. [6] is based on the observation that, in a rapidly changing organizational environment, workplace performance cannot be explained solely by traditional task- and context-based dimensions. According to the authors, the modern organizational environment is characterized by rapid technological changes, internal transformations, globalization, and increasing uncertainty, which require employees not only to possess a high level of professional knowledge but also to demonstrate continuous adaptability. Nevertheless, traditional performance models—which primarily focus on task and contextual performance—do not

provide a satisfactory framework for describing the phenomenon of adaptation. Thus, the goal was to develop an independent, empirically grounded adaptive performance model. In their two-stage study, they first identified work situations requiring adaptation, and then developed a multidimensional, adaptive performance taxonomy based on the situations mentioned. The final model defines eight performance dimensions, which are as follows: managing emergencies and crises; managing workplace stress; creative problem-solving; managing uncertain and unpredictable situations; mastering new tasks, technologies, and procedures; interpersonal adaptation; cultural adaptation; and adaptation to the physical environment. The authors emphasize that these dimensions are emphasized to varying degrees in different job roles. In the second study, following a large-scale data collection, the Job Adaptability Inventory was developed, which measures the eight adaptive performance dimensions through 68 behavioral items and confirmed the validity of the model's basic structure. The questionnaire does not measure individual abilities but rather assesses the extent to which a given job requires adaptive behavior. The results show that adaptive performance consists of several distinct behavioral patterns, though their weight varies by job; at the same time, the dimensions of adaptive performance can be measured in a stable and consistent manner. The study provides a fundamental theoretical and practical framework for measuring, selecting, and developing adaptability [6].

Joie-La Marle et al. examine [7] the various taxonomies of soft skills within the framework of a systematic literature review and organize them into a unified conceptual framework. Based on 237 publications, the authors identify 92 genuine soft skills, emphasizing their transversal, non-technical, and performance-related nature. By definition, these skills can be learned and developed, are directly linked to performance, are not tied to specific technologies, and can be applied in a variety of work environments. One of the central findings of the article is that soft skills align closely with the dimensions of Pulakos et al.'s adaptive performance model [6]. Skills such as problem-solving, adaptability, emotional regulation, creativity, and interpersonal sensitivity all play a key role in successfully adapting to an uncertain, rapidly changing work environment. The authors point out that soft skills often develop implicitly through experience, which makes measuring them challenging, yet underscores their central role in adaptive performance. For this reason, one key to developing soft skills is making them explicitly conscious, for example through metacognitive training. This study confirms and expands upon the model proposed by Pulakos et al. and provides practical guidance for the development of adaptive work performance [6] [7].

Joie-La Marle et al. examine [8] the impact of a new training program aimed at developing soft skills based on metacognition among employees. The main novelty of the study is that the authors focus not on the soft skills themselves, but on the development of metacognitive knowledge about them. Following Flavell's (1979, cited in [8]) classic definition, they interpret metacognition as "thinking about thinking" and distinguish three levels of knowledge within it (declarative,

procedural, and conditional). The authors start from the premise that a significant portion of soft skills develop implicitly through experience, so raising employees' awareness of these skills can be highly beneficial. Following their surveys, they demonstrated using an empirical, quasi-experimental method that a brief, structured intervention significantly increases participants' metacognitive knowledge regarding soft skills, which in part leads to an increase in generalized self-efficacy. The increase in self-efficacy plays a mediating role in the improvement of adaptive performance, particularly in the areas of creative problem-solving, reactivity (rapid adaptation), learning and development efforts, and interpersonal adaptability. The results suggest that raising awareness of soft skills itself can be an effective and cost-efficient way to improve workplace performance and adaptability, as increased awareness boosts self-efficacy, which in turn improves adaptive performance [8].

Jain, Bajaj, and Singh conduct [9] an integrative literature review examining the role of metacognition in the development of cognitive competencies and performance in the workplace. Based on Brown's two-factor model, the authors argue that metacognition acts as a key mechanism supporting adaptive work performance in areas such as learning, problem-solving, decision-making, innovation and creativity, as well as individual and organizational performance. Empirical findings confirm that the role of metacognition is far more significant than previously thought by experts; thus, as an independent construct of strategic importance, it can contribute to the success of employees and organizations in rapidly changing, uncertain work environments [9].

The Generic Skills Component Approach developed by Lamri and Lubart aims [10] to place the interpretation of hard and soft skills on a unified theoretical foundation. According to the authors' basic premise, there is no fundamental, qualitative difference between the two types of skills: every competency has been built from the same basic components; it is only their weighting and form of manifestation that may differ depending on the given context. Hard skills are objective, easily measurable abilities, while soft skills are non-technical and interpersonal in nature, and often develop through experience; however, both are complementary elements of successful performance. Recognizing the overlaps and interdependencies between these two types of skills contributes to the development of a more integrated skill set, particularly in the areas of strategic thinking and decision-making. The authors emphasize that identifying the common components of skills facilitates the effective development of individuals and lays the groundwork for the development of a more unified theoretical framework [10].

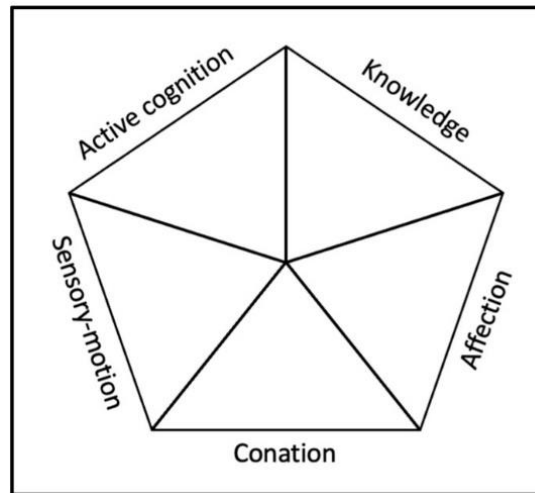


Figure 1
A framework illustrating the components of general skills
Source: Lamri & Lubart, 2023

The model distinguishes five interrelated components. Knowledge encompasses external, declarative knowledge and internal, experiential knowledge. Active cognition refers to the interpretation and processing of situations and information, as well as decision-making. Conation describes individual motivations, goal orientation, and volitional action. The effective component encompasses the management of emotions, empathy, and the maintenance of social relationships. Finally, sensory-motor abilities represent physical, sensory, and motor elements. One of the framework's most significant contributions is that it interprets different competencies not as separate entities, but as dynamic, context-dependent patterns. This enables comparable description, development, and examination of skill transfer in both education and the workplace [10].

The pentagonal framework presented in the article provides a common “measurement framework” for all skills. Each of the five dimensions mentioned above is assessed on a five-point scale. Among the examples presented, verbal communication received high scores across nearly all elements: it requires not only knowledge and thinking but also empathy and a willingness to act. In Python programming, knowledge and active thinking dominate, while the emotional and physical aspects are pushed into the background. Logical analysis, meanwhile, is highly cognitive, with few emotional and sensorimotor components. This suggests that hard and soft skills are not so sharply distinguished but rather represent different combinations of the same components [10].

The model therefore does not strive excessively to separate the two sets of competencies; moreover, the authors' basic premise is that both types of

competencies contain elements from the other set, which the model effectively demonstrates.

3 Method

The research methodology was based on an AI-supported, qualitative comparative synthesis aimed at integrating three key theoretical and empirical frameworks. The analysis was based, on the one hand, on a systematic review exploring the taxonomy of soft skills, and on the other hand, on empirical research examining the impact of metacognitive training, as well as a common component-based model of hard and soft skills. The goal was to create a common, transparent, and applicable structure from the above elements. On the other hand, I tried to explore how Lamri & Lubart's framework [10] could be applied in practice.

At first, I used AI to structure the competency concepts, definitions, and dimensions extracted from the selected studies. It is important to note that not only the analysis was performed by artificial intelligence, but the specific coding method was also selected by the AI based on the available information and patterns. Subsequently, the AI applied thematic clustering and relational analysis to explore how the various approaches relate to one another in terms of the ontology, components, and functioning of skills. Particular attention was paid to the mapping between taxonomic elements and adaptive performance dimensions.

During the analysis, the framework of generic skill components played an integrative role, enabling the resolution of the hard–soft dichotomy and a dynamic, context-dependent interpretation of skills. Parallely, metacognition appeared in one case as a regulatory mechanism, serving as a dimension that unifies the entire competency framework, while in the other case it constituted a new, i.e., sixth dimension of the five-dimensional framework.

The method was supplemented with findings from our own research, which emphasized the distinction between simple and complex competencies. As a result of the model synthesis, a multi-level, hierarchical, yet multidimensional model was developed that captures the layered and adaptive nature of competencies. This approach allows us to interpret competencies not as isolated elements, but as a system of interrelated components.

3.1 Methodological considerations and limitations

A methodological limitation is that while the incorporation of artificial intelligence is an innovative endeavor, in its current form its explanatory power exceeds its reproducibility; thus, the following issues may arise regarding the decision points of AI-based coding.

- Selection of coding strategy: the method chosen by the AI itself (e.g., thematic clustering or category-based coding).
- Development of categories: what competency dimensions are created, what is considered a separate unit?
- Level of abstraction: to what extent does it aggregate concepts (e.g., “simple” vs. “complex” skills)?
- Defining relationships: how does it organize the models in relation to one another (hierarchy vs. network)?
- Positioning of metacognition: does the AI treat it as a dimension or as a regulatory level?

Possible biases may arise whether the perspective of the included studies dominates the results, overgeneralization of pattern recognition, loss of context, simplification of complex phenomena into categories (reductionism), the “translation” of meanings into AI’s own linguistic patterns (interpretation bias), as well as uncertainty regarding reproducibility—that is, the fact that the same input may not necessarily produce the same output.

In terms of the role of human validation, I found it important to review the various categories (assessing content validity), ensuring theoretical alignment (content consistency with literature), the need for correction and fine-tuning (correcting erroneous combinations and misinterpretations), and increasing transparency by documenting the decision-making logic.

4 Results

Based on the results, Figure 2 illustrates an integrated, multi-level competency model that presents both the various conceptual definitions and the functioning of soft skills. At the lower level of the model are hard competencies, which are based on stable knowledge and low context dependence and provide the foundation for task execution. Simple soft skills are built upon this level; which correspond to the elements of the taxonomy identified by Joie-La Marle et al. [7] and consist of well-defined behaviors that often operate implicitly. At the next level, complex, adaptive soft skills emerge, which require the integration of multiple core competencies, in line with the dimensions of adaptive performance. The top layer of the model is the metacognitive level, which ensures the awareness, regulation, and context-appropriate application of skills, and is consistent with the empirical results of metacognitive training [8].

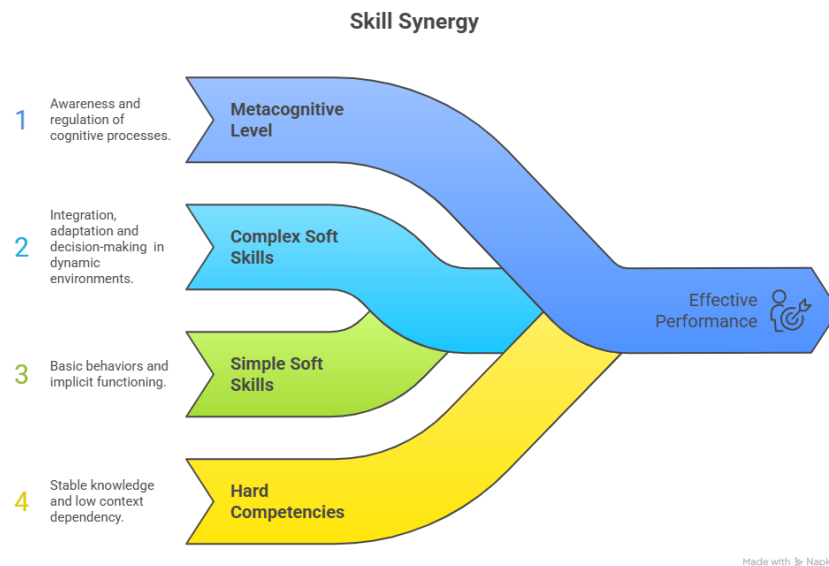


Figure 2.
A hierarchical, layered synthesis of competencies
Source: Created by the author using Napkin AI

The figure emphasizes that the levels are not separate but build upon one another and function synergistically. Effective performance does not stem from a single skill, but from the dynamic interaction of its components, which supports the dissolution of the hard–soft dichotomy and the layered, adaptive nature of both simple and complex competencies [10] [2]. This framework also interprets the 92-item taxonomy list as a set of skills operating with varying component ratios [7]. The key role of the metacognitive level lies in making implicit processes explicit, thereby increasing self-efficacy and supporting adaptability, particularly in changing workplace environments, which can be a key to organizational success. This reinforces the model’s practical relevance [7] [8].

Figure 3 illustrates a structured separation of competencies that justifies the separate treatment of hard and soft competencies. The theoretical basis for the figure is the recognition that soft competencies are much more closely linked to the dimensions of Pulakos’s adaptive performance model, while hard competencies are primarily tied to stable, well-defined elements of knowledge. The introduction of the metacognitive level plays a key role in this distinction, as it allows us to examine the extent to which employees are aware of the method of functioning their own competencies. While this awareness is typically high and explicit in the case of hard competencies (essentially assuming a high level of metacognition), soft

competencies often operate implicitly and only become graspable and measurable in terms of adaptive performance through metacognitive awareness.

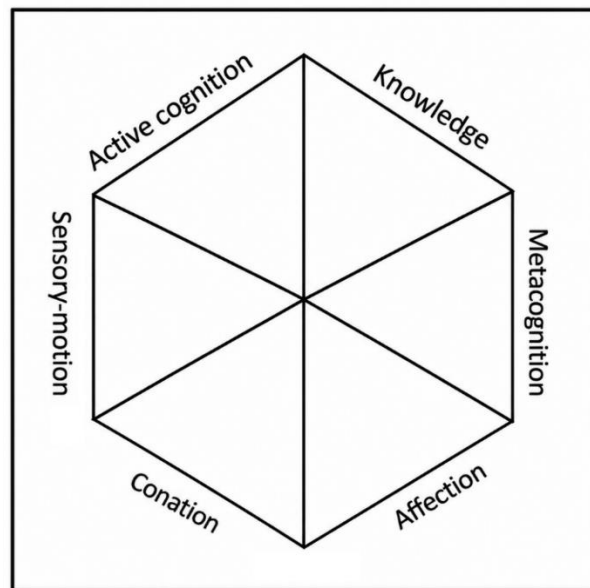


Figure 3.

A framework illustrating the components of general skills
Source: Edited by the author adapted from Lamri & Lubart (2023)

The figures presented in this article visually structure the interrelationships and operational characteristics among the different types of competencies, thereby facilitating their recognition. Layered and dimensional approaches facilitate the distinction between hard and soft competencies not only in terms of content but also in terms of functioning and awareness. As a result, the diagrams contribute to the development of a coherent, theoretically grounded competency classification system that provides a meaningful framework for both assessment and development.

Conclusions

Based on the research findings, an integrated, multi-level competency model emerges that is capable of linking taxonomic, component-based, and function-centered approaches to soft skills. One of the model's main outcomes is that it can resolve the rigid dichotomy between hard and soft competencies and interprets skills as dynamic, context-dependent, interdependent systems. The metacognitive level

plays a key role, as it supports adaptive performance and increased self-efficacy by raising awareness of implicit processes.

The results also indicate that competencies are not mutually exclusive but rather context-dependent elements that build upon one another (hard: to a lesser extent, soft: to a greater extent), contributing to effective work performance through synergistic interaction. This approach can lay a new foundation for competency development and assessment.

The above conclusions are further reinforced by the fact that the diagrams associated with the model present the functioning of competencies not as static categories, but as tools for interpretation and measurement. In the process of identifying competencies, combining different models can help to distinguish stable, consciously possessed "hard" elements from the "soft" components that are critical for adaptive performance and are often implicit. This visual and conceptual clarification not only supports theoretical systematization but also facilitates, at the practical level, the planning of competency development interventions, the fine-tuning of assessment tools, and a more precise description of job-related and higher education outcome expectations.

The presented multi-level model may serve as a starting point for a measurement framework, can be adapted to competency-based assessment systems and provides a solid foundation for empirical scaling. However, in its current form, it still requires further empirical validation and refinement. The goal of future research is to develop the framework into a measurement model that provides reliable, valid, and practically applicable results in the assessment of competencies.

References

- [1] Mészáros, Á.; Csiszárík-Kocsir, Á.: The importance of soft skills in the 21st century: Mapping the background of student group work based on the results of primary research, Proceedings of the IEEE 23rd International Symposium on Intelligent Systems and Informatics (SISY 2025), IEEE, 2025, pp. 285–290.
- [2] Pataki-Juhász, A. (2026). Munkaerőpiaci kompetenciaelvárások a 2000 és 2025 közötti időszakban, különös tekintettel a digitalizáció puha készségekre gyakorolt hatásaira. *Digitalizáció és Üzleti Trendek*, 2026(2), 22–36.
- [3] Deming, D. J.; Silliman, M. I.: Skills and human capital in the labor market, NBER Working Paper No. 32908, National Bureau of Economic Research, 2024, pp. 1–48.
- [4] Colledani, D.; Robusto, E.; Anselmi, P.: Assessing key soft skills in organizational contexts: Development and validation of the multiple soft skills assessment tool, *Frontiers in Psychology*, Vol. 15, 2024, pp. 1–16.

- [5] Rahnev, D.: A comprehensive assessment of current methods for measuring metacognition, *Nature Communications*, Vol. 16, 2025, pp. 1–19.
- [6] Pulakos, E. D.; Arad, S.; Donovan, M. A.; Plamondon, K. E.: Adaptability in the workplace: Development of a taxonomy of adaptive performance, *Journal of Applied Psychology*, Vol. 85, No. 4, 2000, pp. 612–624.
- [7] Joie-La Marle, C.; Parmentier, F.; Coltel, M.; Lubart, T.; Borteyrou, X.: A systematic review of soft skills taxonomies: Descriptive and conceptual work, *PsyArXiv*, 2021, pp. 1–132.
- [8] Joie-La Marle, C.; Parmentier, F.; Weiss, P.-L.; Storme, M.; Lubart, T.; Borteyrou, X.: Effects of a new soft skills metacognition training program on self-efficacy and adaptive performance, *Behavioral Sciences*, Vol. 13, No. 3, 2023, pp. 1–21.
- [9] Jain, S.; Bajaj, B.; Singh, A.: Linking metacognition, workplace cognitive competencies and performance: An integrative review-based conceptual framework, *Primenjena Psihologija*, Vol. 16, No. 1, 2023, pp. 107–147.
- [10] Lamri, J.; Lubart, T.: Reconciling hard skills and soft skills in a common framework: The generic skills component approach, *Journal of Intelligence*, Vol. 11, No. 6, 2023, pp. 1–19.