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**REVIEW OF THE DOCTORAL DISSERTATION by John Muzam, MSc, entitled:
"The Competency Framework of Knowledge Workers in the Age of Digital Transformation"
written under the scientific supervision of Jacek Bendkowski, PhD, Prof. of AWSB**

Formal basis for the review

The basis for the review of the doctoral dissertation is the letter from the Chair of the Discipline Council for Management and Quality Studies at the Silesian University of Technology, Lilla Knop, PhD, Eng., Prof. of SUT, dated 24 September 2025, and Resolution No. 46/2025 of the Discipline Council for Management and Quality Studies at the Silesian University of Technology dated 17 September 2025, according to which I was appointed as the reviewer of the thesis.

Assessment of the selection of the research topic and the subject of the dissertation

The topic of the dissertation concerns a current and important issue in the field of management and quality studies, particularly in the area of improving the competences of knowledge workers in the era of digital transformation. In the context of dynamic changes in the business environment and the difficulty of predicting them, the ability to respond quickly and flexibly to emerging opportunities and threats is becoming increasingly important. The concept of a learning organisation is developing. Management of employee competencies can be a key element in creating competitive advantage. The increasingly common digital work environments require new employee competencies. The use of advanced technologies requires significantly greater technical skills from employees and their willingness to continuously learn and acquire new competencies. Employees are becoming a strategic resource for companies, which is why it is increasingly important to invest in human capital, assess employee competencies, develop career programmes and improve the efficiency and quality of their work.

Although many scientific publications emphasise the need for new skills resulting from digital transformation, there are few research results that indicate specific sets of required skills. Therefore, I conclude that the doctoral student has correctly identified the research gap in accordance with the facts and has correctly formulated the title of the thesis. The dissertation contains a comprehensive justification for the choice of research problem and meets the expectations and requirements for doctoral dissertations in this regard.

Composition of the thesis, substantive content, research results and their practical application

The doctoral dissertation submitted for review was written in English and contains a total of 272 pages, including: title page, abstract in English and Polish (4 pages), table of contents (3 pages), introduction (9 pages), main text (155 pages), general conclusions (5 pages), bibliography (49

pages), list of 37 tables (2 pages), list of 16 figures (1 page), glossary of abbreviations (1 page), glossary of key terms (3 pages) and 3 appendices (39 pages). The structure of the dissertation is consistent with the title, forms a logical, orderly whole and corresponds to the research methodology aimed at achieving the objectives set by the doctoral student and verifying the hypotheses.

The main content of the dissertation consists of six chapters with clearly distinguished theoretical and empirical parts. Chapters 1, 2 and 3 contain an analysis of the literature in the field of digital transformation, knowledge-based work, and the skills and competences of knowledge workers. The literature review is thorough, based on a very extensive literature on the subject (660 items), properly focused on the research objectives and closely related to the topic of the thesis. The doctoral student has demonstrated a good general theoretical knowledge of the issues discussed, which fall within the discipline of management and quality studies. The language of the thesis is communicative and correct.

In the first chapter, entitled "Digital Transformation and the World of Work", the author describes the impact of digital transformation on organisations. He states that knowledge is one of the most valuable assets of a modern enterprise. The candidate emphasises the growing importance of networked and learning organisations, the demand for new skills and competences among employees, and the need for changes in human resource management.

The second chapter, "Knowledge Work and Knowledge Workers", attempts to identify the unique characteristics that knowledge workers should possess. The needs of modern organisations in this area are presented in an interesting way. There is a noteworthy comparison of modern knowledge management with traditional one made according to several criteria, contained in Table 5. The author draws attention to the need for knowledge flow in network organisations and the role of cooperation. He also notes that knowledge-based work involves tasks that require an innovative approach and a high level of creativity and cognitive effort, i.e. solving complex problems, critical, adaptive and flexible thinking, and decision-making. It also requires continuous learning and improvement of skills. Information technology is used particularly intensively in the knowledge-based work. Knowledge workers rely heavily on advanced tools and digital resources to collect, process and disseminate information, which increases productivity. The doctoral student drew interesting conclusions based on the literature, presenting organisational factors that influence the productivity of knowledge workers.

Chapter 3, "Competencies of Knowledge Workers," describes the essence and role of competencies and presents learning theories. It emphasises the importance of soft skills in the information and communication technology (ICT) sector, such as teamwork, problem solving and communication, which complement technical competencies. In this chapter, the doctoral student correctly and clearly identified a research gap. He stated and comprehensively proved that current learning models and theories are insufficient in relation to the requirements placed on knowledge workers in the digital age. Traditional competency models also fail to meet the expectations arising from the use of advanced digital technologies, networked learning environments and the growing importance of skills such as learning agility and complex problem solving. He also confirmed the need to create new, digitally adapted learning paradigms. In view of all the above arguments, it can be concluded that this chapter is particularly valuable in terms of justifying the research.

In Chapter 4, "Research Design and Methodology", the author referred to the arguments presented in the previous chapters and stated that digital transformation is changing work

environments by reshaping the requirements for knowledge workers as well as their roles, and that there is a research gap in the precise identification, conceptualisation and structuring of the necessary competencies of knowledge workers. The doctoral student formulated the research objectives and questions, described the research problem, and outlined the methods and tools used. The research concept is discussed in a clear and comprehensible manner. The graphical presentation of the adopted methodology in the form of tables and figures, which significantly increases its readability, is noteworthy.

Chapter 5, "Findings and Discussions," contains a description of the research results and a discussion. Each of these two parts is divided according to the type of research conducted, i.e., expert panel and survey research. The discussion section also includes a subchapter on the development of a dynamic competency structure. A major advantage of the argument presented in this chapter is that the text is divided into sections containing answers to specific research questions, which makes the text understandable and clear. This chapter is also abundant with figures and tables that increase the readability of the research results.

Six questions were asked in the expert panel. Responses were received from 17 people from 14 different countries. A total of 183 people took part in the survey. In my opinion, the potential for achievable results in the expert panel was much greater. The experts who took part in this study had extensive knowledge and experience, and it would have been possible to ask more questions in greater detail and obtain more interesting results. For example, the results of the study indicated that "digital competences were the least important, with only 5.88% of respondents indicating them as the most important". The doctoral student assumes that "this may indicate that respondents assume digital skills to be a basic requirement and therefore prioritise the development of other competences." However, such interesting results could be explained immediately with a more extensive set of questions in the expert panel. Despite this comment, I find that the empirical research results and discussion presented in Chapter 5 are of great substantive value, are presented in a reliable and interesting manner, and certainly contribute to the development of the discipline of management and quality studies.

In Chapter 6, "The Development of Competency Framework for Knowledge in the Age of Digital Transformation," based on the research results presented in Chapter 5, the author proposed a "more integrated" competency framework for knowledge workers in the digital age, covering learning, technical and interdisciplinary competencies that place greater emphasis on skills such as cognitive flexibility, digital competencies and adaptability. Each competency identified in the research was assigned to specific skills or areas of competence within a subcategory, which made it possible to create certain levels for each competency. Thanks to the proposed solution, competencies can be matched to the stage of professional development and compared with international standards. It also helps to recognise skills in different organisations and education systems. The competency framework developed has been adapted to the unique context of the Silicon Mountain region in Cameroon to enable the examination of specific cultural, economic and infrastructural factors affecting knowledge-based work in this region.

The summary of each chapter is the advantage of the dissertation. It increases readability and emphasises the structured nature of the dissertation and, in a way, justifies the order of the research process undertaken by the doctoral student. The general conclusion of the candidate's research is that the competences of knowledge workers are multifaceted, covering various areas, from technical skills to soft skills. The research results are consistent with the assumptions of knowledge-based work in the digital age and point to the important role of communication, task management, problem solving and the adaptability of employees.

The results of the empirical research can certainly be applied in practice to help:

- specialists who want to develop their competences to fill in the gaps,
- employees to plan their career paths,
- individuals and organisations to obtain a coherent and progressive education path,
- employers and HR departments in planning training,
- organisations to create development programmes for their employees,
- institutions and entrepreneurs to recognise skills in different organisations and education systems.

The extremely rich literature deserves recognition. A total of 660 literature items were used in the work. All source items were correctly selected. However, the doctoral student's reference to only two of his own publications from 2022 and 2023 leaves something to be desired:

- Muzam, J., & Tambi, M. D. (2023). *The Relationship Between Mobile Money Services and Small and Medium-Sized Enterprise Growth in Bamenda, Cameroon: A Probit Model Approach*. Journal of African Business, 1-15. <https://doi.org/10.1080/15228916.2023.2196173>,
- Muzam, J. (2022). *The Challenges of Modern Economy on the Competencies of Knowledge Workers*. Journal of the Knowledge Economy 2022, 1-37. <https://doi.org/10.1007/S13132-022-00979-Y>.

Assessment of the aim of the dissertation, hypotheses and research methods used

The doctoral dissertation addresses the key research problem of identifying and conceptualising the pivotal competencies of knowledge workers operating in environments undergoing profound digital transformation. The main objective of the dissertation was "to develop a comprehensive competency framework for knowledge workers in the era of digital transformation. This framework aims to equip knowledge workers with the skills necessary to adapt and thrive in a dynamic work environment characterised by continuous digital progress and technological integration."

The doctoral student named the following specific objectives:

- examining the impact of digital transformation on work structures and processes,
- understanding the specific nature of knowledge-based work in the digital era,
- assessing and developing the theoretical foundations of knowledge workers' competences,
- analysing the evolution and future direction of competence development,
- identifying key emerging competencies and ways in which organisations can prepare for future skill requirements,
- developing a comprehensive competence framework tailored to the digital economy,
- testing and verifying the hypotheses formulated.

The author formulated six research questions:

- 1) How does the phenomenon of digital transformation change the fundamental nature, structure and operational context of knowledge-based work in contemporary organisations?
- 2) What are the defining characteristics of knowledge work in the digital age, how does it differ from traditional work, and how do these characteristics most directly shape the required professional competences?
- 3) Are existing competency frameworks and learning theories appropriate for knowledge work in the digital age, and what are their main limitations?
- 4) What specific competences – such as technical, cognitive, social, self-management and learning-related – are essential for knowledge workers to find their place and thrive in

the face of ongoing digital transformation, and how is their relative importance evolving?

- 5) Which new competences are likely to gain importance, and how can organisations anticipate and prepare for these future skill requirements?
- 6) What are the basic components and structural elements of a comprehensive and robust competency framework tailored to knowledge workers in the digital age?

Three research hypotheses were proposed in the study:

- H1: The identified competency groups, including digital competencies, cognitive competencies, learning agility, social competencies, self-management, socio-emotional competencies, and leadership, are critical for effective knowledge work in the era of digital transformation.
- H2: Specific competences in the cognitive skills group (such as critical thinking and creativity) and in the social skills group (such as communication skills) have the greatest positive impact on effective knowledge-based work in the era of digital transformation.
- H3: The knowledge worker competency framework presents a dynamic and structured relationship that can be effectively represented with the use of a three-level structure: core competencies, supporting competencies and strategic competencies, with each level building on the previous one.

In summary, the main objective, specific objectives, research questions and hypotheses have been formulated clearly and precisely. In my opinion, they are comprehensive. The author has developed a correct research model. However, it was unnecessary to rephrase the research questions in the introduction and chapter four, which may be debatable, especially in the third question, due to the absence of the second part of the question in chapter four, "... and what are their main limitations", which, however, changes the scope of the answer to this question.

Methodological triangulation was used in the dissertation. Quantitative and qualitative methods were used to verify the hypotheses, such as:

- a systematic literature review,
- an expert panel,
- surveys of knowledge workers.

In Table 15, the author very precisely defined the goal he wants to achieve, the research method he uses to achieve it, and the answers he expects, which is a valuable summary and organises the research methodology. He used several analytical techniques in his research: descriptive statistics to analyse the dimensions of knowledge workers' competencies, reliability analysis to assess the internal consistency of competency dimensions, and correlation analysis to examine the relationships between variables related to knowledge workers' competencies.

The expert panel consisted of 17 people from 14 countries. The questions for the expert panel were based on seven distinct groups of competencies: digital competencies, cognitive skills, learning efficiency, social competencies, self-management, social and emotional competencies, and leadership. Their detailed description is included in Appendix 2.

I consider this multi-stage, properly described research process using mixed methods to be sufficient to solve the research problems formulated by the author of the dissertation, despite a few comments mentioned earlier. The observations from the literature, expert validation and the perspective of practitioners contained in the dissertation provide a solid basis for the development of a comprehensive and empirically justified competence framework for knowledge workers in the digital age.

Originality and achievements of the doctoral student

Based on the presented research results, it can be concluded that the objectives formulated in the thesis have been achieved and new results have been obtained, and the hypothesis validation process has been carried out correctly. The most important achievements of the doctoral student, constituting his independent and original work, include:

- undertaking an original, topical area of dissertation research,
- constructing a correct research methodology,
- correctly conducting a critical analysis of the subject literature, based on very rich, correctly selected literature, which resulted in broadening the understanding of competences through the synthesis of various learning theories (individual, group, network) and competence perspectives, creating a more holistic and integrated picture adapted to the digital context,
- a structured overview of the skills and attributes required of knowledge workers,
- examining specific cultural, economic and infrastructural factors influencing knowledge-based work and analysing the competences of knowledge workers in the developing African technology ecosystem – Silicon Mountain in Cameroon,
- identifying the growing importance of interpersonal and adaptive competencies (such as emotional intelligence, collaboration, communication, learning agility and resilience), interacting with technical proficiency,
- developing an integrated framework of knowledge worker competencies in the digital age, taking into account both technical and soft skills, i.e. learning, technical and cross-cutting skills, which consider cognitive flexibility, digital competences and adaptability as key,
- assigning each competence identified in the study to the relevant skills or areas of competence within a subcategory, creating three interrelated levels representing basic, supporting and strategic competencies necessary for knowledge workers in the digital age, enabling the alignment of competencies with career development stages and comparison with international standards,
- developing a category-based structure that ensures a balance between technical, transversal and educational competencies and prevents an excessive focus on one type of skill at the expense of others.

General comments and questions:

- 1) Table 6 presents the characteristics of knowledge workers, but it lacks an analysis of the latest literature from recent years, which would certainly increase the relevance and value of the information presented. Hence, my question: What characteristics have defined knowledge workers in recent years? Can any changes be identified in comparison with the results of the analysis presented in Table 6?
- 2) On page 136, the doctoral student wrote that "The proposed competency framework is intentionally tailored to the unique context of Silicon Mountain, Cameroon." Please explain the specificity of the competency framework in this region compared to competency frameworks from a "Western-centric viewpoint".
- 3) On page 137, it is stated that "the framework is organised into three interconnected tiers, representing the foundational, enabling, and strategic competencies vital for knowledge workers in the digital era". Please explain why there are three. What is the reason for this? What changes would the doctoral student expect if there were more levels? When and why would it be worthwhile to divide the competency framework into more levels?

- 4) The expert panel consisted of 17 people from 14 countries (Table 17). The author mentioned on p. 98 that the expert panel was used to confirm the findings from the literature review with actual activities in work environments. However, the abstract of the paper emphasised that "the innovative aspect of this study is the empirical analysis of the competencies of knowledge workers in the developing African technology ecosystem", which, as I understand it, goes "beyond the dominant Western perspective". This raises the question: How were the individual countries selected? How did the different characteristics of work environments in different countries influence the results of the study, according to the author?
- 5) Were methods other than an expert panel considered? What arguments influenced the choice of this particular method?
- 6) Is the integrated framework of knowledge workers' competences in the digital age developed by the doctoral student universal in nature? Is it dedicated to specific industries, companies or types of organisations?

Specific comments:

- only subsections 3.3.1 and 3.4.2 are highlighted
- numbering error — there is no subsection 3.4.1
- use of Roman and Arabic numerals in page numbering
- On p. 99, the author refers to Table 18, but this table does not contain the data described in the text — Figures 6 and 7 should be indicated.
- The form of recording information in Appendix 3 is unfortunate and difficult to read.

CONCLUSION

In summary, I conclude that the doctoral dissertation submitted for review, entitled "The Competency Framework of Knowledge Workers in the Age of Digital Transformation", prepared by John Muzam, MA, under the supervision of Jacek Bendkowski, PhD, Prof. of AWSB, is a valuable work demonstrating the candidate's broad general theoretical knowledge in the field of management and quality studies, contains the results of his own scientific research and an original solution to a scientific problem. The author has demonstrated the ability to conduct independent scientific work and proficiency in the use of research tools. In my opinion, **the doctoral dissertation meets the conditions specified in Article 187 of the Act of 20 July 2018 Law on Higher Education and Science, and therefore I request the Discipline Council for Management and Quality Studies at the Silesian University of Technology to admit it to the further stages of the procedure for awarding a doctoral degree in the field of social sciences in the discipline of management and quality studies.**

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