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REVIEW

of the Doctoral Dissertation by John Muzam
on the subject of „The Competency Framework of Knowledge Workers in the Age of Digital Transformation"

*Supervisor: **Jacek Bendkowski**, PhD, DSc, Associate Professor at the WSB University*

1. Formal basis for conducting the review

Letter from the Chair of the Management and Quality Discipline Council, Faculty of Organization and Management, Silesian University of Technology, **Lilla Knop**, PhD, DSc Eng., Associate Professor at the Silesian University of Technology, dated September 24, 2025.

2. Evaluation of the selection of the research problem and dissertation topic

The doctoral dissertation submitted for review addresses a highly relevant and timely issue: the effective and efficient management of knowledge workers' competencies in the era of digital transformation. The dissertation correctly assumes that in the era of the Fourth Industrial Revolution, known as Industry 4.0, digital technologies—such as artificial intelligence, big data, the Internet of Things, machine learning, blockchain, and cloud computing—are radically reshaping organizational functioning. This shift has elevated the importance of knowledge workers, who create, analyze, and utilize knowledge rather than merely performing routine tasks. As a result, the competencies required for effective performance are evolving: traditional technical skills are no longer sufficient, and digital, cognitive, social, and adaptive competencies have become essential. Scholars continue to seek models that can help understand, develop, and measure these emerging competency sets.

The research problem defined in the dissertation represents an ambitious challenge, both in terms of its focus and context. The focus of the study is the management of competencies—

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redefining and enhancing knowledge workers' skills and developing a comprehensive, empirically grounded competency model tailored to the digital era. The concept of competency is complex and multidimensional, and it is difficult to provide a clear-cut definition of knowledge workers. Moreover, digital technologies are continuously reshaping professional competencies. Constructing a coherent and operational model that integrates various theoretical approaches, can be empirically validated, and remains practically useful for management practice is, in itself, a significant scientific challenge. The context of the study is the African technology ecosystem, which is somewhat niche, as it extends beyond the predominant Western perspective.

In management theory, there is a lack of holistic, empirically validated competency frameworks for knowledge workers operating in diverse digital environments. This need was recognized by the Doctoral Candidate, which is reflected in the concept and title of the dissertation, as well as in its individual chapters. Developing comprehensive competency frameworks for knowledge workers represents an original contribution. The dissertation integrates elements of human resource management, strategic management, competency engineering, and information technology, creating a novel cognitive and practical value. In this context, the choice of the dissertation topic and research focus is both justified and significant.

The reviewed dissertation has both theoretical-cognitive and practical-utilitarian value. From a theoretical-cognitive perspective, it is significant because it focuses on identifying the key competencies of knowledge workers. Equally important is the utilitarian perspective—the proposed model can assist organizations in optimizing their human capital, for example by enhancing the effectiveness of training, streamlining recruitment processes, fostering a culture of continuous learning, and creating personalized professional development paths.

In summary:
- the topic (title) of the doctoral dissertation is clearly and comprehensibly formulated, while simultaneously signaling the addressed research problem;
- focusing on this research problem and making it the subject of the dissertation represents an ambitious and intellectually stimulating challenge, the resolution of which provides a solid foundation for awarding the Doctoral degree in the discipline of management and quality sciences;
- the selection of the research problem and dissertation topic is a notable strength of the reviewed doctoral thesis.

3. Evaluation of research objectives and hypotheses

The dissertation establishes one main objective and seven specific objectives, formulates six research questions, and proposes three hypotheses. These elements are outlined in the introduction (pp. x–xii) and in Subsection 4.1. Research Design and Methodology (pp. 91–93).

The primary objective of the reviewed dissertation is *"to develop a comprehensive competence framework for knowledge workers in the digital transformation age,"* accompanied by three corresponding hypotheses:

H1: *„The identified competency groups, including digital, cognitive, learning agili-ty, social, self-management, social and emotional, and leadership, are crucial for effective knowledge work1 in the age of digital transformation".*

H2: *„Specific competencies within the cognitive skills group (such as critical thinking and creativity) and the social skills group (such as Communication Skills) have the greatest positive impact on effective knowledge work performance in the age of digital transformation".*

H3: *„The competency framework for knowledge workers shows a dynamic and structured relationship that can be effectively represented by a three-tiered framework: foundational competencies, enabling competencies, and strategic competencies, where each tier builds upon the preceding one".*

The dissertation title, main objective, and hypotheses are closely interrelated. Both the main objective and the hypotheses have identifiable strengths and weaknesses. The strengths of the main objective include: 1) Clarity and precision of the research direction – the objective clearly specifies that the dissertation focuses on developing a comprehensive competence model for a specific group of employees; 2) Relevance of the topic – the objective aligns with actual labor market needs and with management science theory; 3) Practical applicability – the competence framework can be implemented in organizations, for example in employee recruitment processes, development programs, or evaluation systems.

A notable limitation of the main objective is the lack of clarity regarding the research context. It is not specified whether the model is intended for a particular sector, region, type of organization, or is meant to be fully universal. Additionally, the broad notion of 'knowledge workers' poses a challenge, as this category encompasses a wide range of roles—from data analysts to educators—with potentially significant differences in competencies across subgroups, suggesting a need for more precise segmentation. Moreover, the research outcomes are confined to the development of the competence framework itself. Crafting a fully

comprehensive and universal framework may be difficult to accomplish within the scope of a single doctoral dissertation.

Among the strengths of the formulated hypotheses, I would primarily highlight their consistency with established competence development theory—the identified groups of competencies are widely discussed in the context of digital transformation and knowledge workers, and are considered key 21st-century competencies. Additionally, the hypotheses feature clear cause-and-effect relationships, which can be empirically tested using either quantitative or qualitative methods.

The primary weaknesses of the hypotheses are as follows: 1) The first hypothesis lacks prioritization, as all listed competency groups are described as 'key,' which may result in tautology or complicate precise empirical verification; 2) The second hypothesis risks neglecting the organizational context, since the 'greatest impact' of certain competencies may vary depending on industry, organizational culture, or hierarchical level; 3) The third hypothesis carries the risk of artificially fitting the model, as the proposed three-tier framework may not fully capture the more complex, real-world structure of competencies.

In conclusion, notwithstanding these reservations, I positively evaluate the dissertation with respect to its stated objectives and hypotheses.

4. Evaluation of information sources and research methods

The main sources of information were the subject literature, analyzed using the systematic literature review method, and the results of the Doctoral Candidate's own research and analyses, conducted through qualitative methods (expert panel and case study) and quantitative methods (survey, main quantitative study).

The subject literature comprises 661 bibliographic items, primarily journal articles and monographs. The cited literature covers the social sciences, with a particular focus on management and quality studies. The selection and scope of the cited literature are appropriate, enabling the fulfillment of the research objectives. The only drawback is the relatively small number of the most recent sources—only 69 items from 2022–2025 are included in the bibliography, with none published in 2025.

The Doctoral Candidate's own research, including the conduct of the studies, the applied research instruments, and the analyses of the results, raises no objections and can be considered reliable and credible. A mixed-methods approach was employed in the empirical part: qualitative methods included an expert panel and a case study, while the quantitative method

consisted of a survey. The quantitative study allowed for the identification of trends and patterns in knowledge workers' competencies, whereas the qualitative research provided an in-depth insight into the contextual factors driving these trends.

The study results were presented through tables and charts, reporting both nominal values and/or percentages. A range of statistical techniques was applied to ensure the validity and reliability of the findings, including descriptive statistics (standard deviation, coefficient of variation), reliability analyses (Cronbach's alpha), correlation analyses (Cramer's V, chi-square test), as well as regression models and associated measures (probit regression, pseudo R-squared). The application of this comprehensive set of statistical methods to analyze the collected data is fully appropriate.

In summary:
– I believe that the use of specific research methods, techniques, and tools in the research process demonstrates the Doctoral Candidate's strong methodological competence;
– the Doctoral Candidate's own analytical and empirical research conducted for the dissertation also represents a significant strength of the reviewed doctoral thesis.

5. Evaluation of the structure and content of the thesis

The Doctoral Candidate presents the results of his research and analyses in a 272-page dissertation, 233 pages of which comprise the main body (including 49 pages of bibliography), with the remaining pages devoted to appendices. The dissertation consists of an introduction, six main chapters, a conclusion, bibliography, lists of tables and figures, a glossary of abbreviations, and a glossary of key terms. The main body of the thesis includes 37 tables and 16 figures. Three appendices—the systematic literature review method, the identified competencies and their significance, and the literature review matrix— form an integral part of the dissertation.

The adopted structure of the thesis can be considered correct and optimal. Chapters 1–3 provide the theoretical foundation of the doctoral dissertation, while Chapters 4–6 constitute the practical (analytical and empirical) part, presenting the methodology of the doctoral research, empirical research results, the author's competence framework model for knowledge workers in the era of digital transformation, as well as the validation of hypotheses accompanied by discussion and implications.

The introduction outlines the genesis of the research problem, defines the issue and the knowledge gap, presents the objectives and hypotheses of the dissertation, and provides a

concise overview of its chapters. The introduction has been written in accordance with methodological rigor.

As previously noted in this review, Chapters 1–3 form the theoretical foundation of the dissertation, comprising a total of 90 pages—23, 25, and 42 pages, respectively. These chapters provide the theoretical background on digital transformation, examine the concepts of knowledge work and so-called knowledge workers, and identify and conceptualize the competencies characteristic of knowledge workers. Subsections 3.3 and 3.4 are of particular importance.

In subsection 3.3, the function of competence frameworks is discussed, a modern competence model is characterized, and an evaluation of the prevailing universal competence frameworks—namely, the Skills Framework for the Information Age (SFIA) and the European e-Competence Framework (e-CF)—is conducted, highlighting several of their limitations. The subsection also identifies key research gaps in the development of knowledge workers' competencies. Addressing these gaps provided the basis for the development of an improved competence framework.

In subsection 3.4, the results of a systematic literature review are presented, aimed at identifying the effective competencies of knowledge workers in the digital economy and examining their potential interrelations, connections, or groupings in various contexts. Seven key competence dimensions were distinguished: digital competencies, cognitive skills, learning agility, social skills, social and emotional competencies, self-management, and leadership skills (pp. 76–78), which were further categorized into three main groups: individual competencies, group competencies, and learning competencies (p. 88). This analysis contributed to the formulation of a comprehensive competence framework. The topics addressed in these chapters are appropriate, providing a structured overview of knowledge in the subject area. This part of the dissertation lays the groundwork for the development of the author's competence model for knowledge workers in the era of digital transformation.

Chapters 4–6 constitute the empirical part of the dissertation, comprising a total of 61 pages—16, 29, and 16 pages, respectively. Chapter 4 is methodological in nature. In this chapter, the Doctoral Candidate describes the methodology of the empirical research. He begins by defining the research problem, objectives, research questions, and hypotheses, and outlining the research methods employed, including a systematic literature review, expert panels, and a survey, as well as the statistical techniques applied, such as standard deviation, coefficient of variation, Cronbach's alpha, Cramer's V, chi-square test, probit regression, and pseudo R-squared. Subsequently, he provides a detailed characterization of the research populations and

the instruments employed. In the expert panel, a purposive sampling was applied. The panel included 17 respondents from 14 countries, providing a global perspective. The quantitative survey was conducted within the African technology ecosystem (Silicon Mountain, Buea, South-West Cameroon) and involved 183 respondents.

The sample sizes in both studies can be considered sufficient. However, the dissertation does not specify how the experts were approached based on the adopted selection criteria.

Chapter 5 presents and synthesizes the empirical findings from both qualitative and quantitative research. It provides a detailed analysis of the results, focusing on questions related to the perceived importance, development, and interrelationships of various competencies. The chapter highlights key findings that reveal significant patterns, connections, and differences between the perspectives of experts and the experiences of practitioners. Moreover, both theoretical and practical implications of these findings are discussed, contextualized within the existing literature, with particular attention to the impact of the identified competencies on enhancing knowledge work in the era of digital transformation. In the concluding part of the chapter, the Doctoral Candidate addresses the significance of the results for the development of new competence frameworks for knowledge workers, distinguishing three primary levels of competencies: fundamental, enabling, and strategic. This serves ⸝ a contribution to the formulation of a comprehensive framework (model) of competencies for knowledge workers.

This chapter merits a high evaluation. The conducted research significantly enhances the understanding of knowledge workers' competencies in the digital era. It confirms the need for a holistic set of skills that integrates technical proficiency with advanced cognitive, social, emotional, self-management, and adaptive competencies.

Chapter 6, the final chapter, represents a constructive contribution by the Doctoral Candidate to the development of organizational and management theory, in which the individual competence frameworks have been operationalized. The competence frameworks should be regarded as dynamic and flexible tools, subject to regular evaluation and refinement to ensure their continuous alignment with the rapidly evolving digital environment and the changing needs of organizations and industries. The competence frameworks are presented using two models: a Tier-Based Framework with three levels—foundational, enabling, and strategic—and a Category-Based Framework with three domains—technical, transversal, and learning. Each identified competency is mapped to the relevant skills or competency areas within a subcategory, which can be further refined by defining corresponding levels for each competency, thereby aligning them with the stages of professional development observed in the specific context. The defined frameworks have been tailored to the characteristics of the studied

technology ecosystem. Nevertheless, in my assessment, the developed model retains a universal applicability.

All the hypotheses formulated in the dissertation have been tested and confirmed.

I also regard this chapter very highly, as it primarily enriches the theoretical discourse on strategic management, human resource management, and organizational behavior. It presents concrete solutions and practical conditions for implementing competence frameworks for knowledge workers in the era of digital transformation, making the research both applicable and valuable for management practitioners.

In summary, the structure of the dissertation can be considered correct and optimal. The adopted organization effectively presents the research problem and allows for the achievement of the stated research objectives. It can be concluded that, in the reasoning presented, the sequence of content is appropriate and well-structured.

6. Substantive evaluation of the thesis

In my assessment, the overall research process and the results achieved provide a solid basis for awarding John Muzam the degree of Doctor of Social Sciences in the discipline of management and quality sciences.

In particular, I believe that:

- the Doctoral Candidate's approach to the research problem, considered in the context of current knowledge, is sound and fully aligned with the standards of scientific inquiry. When presenting subsequent issues, the Candidate refers to the existing body of knowledge in management and quality studies and applies it effectively to support and substantiate his own research;

- the research topic is timely and addresses issues that continue to require further exploration. The Doctoral Candidate succeeded in identifying a knowledge gap, which constitutes the original research problem undertaken in the dissertation;

- the objectives formulated in the dissertation have been accomplished, and the hypotheses have been verified. The examined issues are thoroughly documented and substantiated by the Candidate's own research findings. The conducted analysis is holistic in nature. The research findings are reliable and confirm the adopted research assumptions;

- the most significant scientific contribution of the reviewed dissertation—representing the Doctoral Candidate's contribution to the development of management and quality

theory—is the formulation of a holistic framework of competencies for knowledge workers in the era of digital transformation;

- the conclusions drawn from the Doctoral Candidate's research are also interesting and valuable for management practitioners.

7. Formal evaluation of the thesis

I note that the Doctoral Candidate demonstrates a fluent and accurate command of contemporary English and the relevant scientific terminology. The dissertation is written in a clear and accessible style, with arguments presented in a logical and coherent sequence. The quality of the tables and figures included in the work does not give rise to any critical remarks.

However, the Doctoral Candidate did not avoid certain formal shortcomings, which I identify as follows:

1. Although the dissertation uses the Harvard referencing system, the in-text citations include only the author's surname(s) and the year of publication. The page number(s) being cited are not provided, which represents a significant deficiency.

2. When a subsection is divided into sub-subsections, at least two sub-subsections should be distinguished. In subsections 3.3 and 3.4, only one sub-subsection is identified in each case, namely 3.3.1 and 3.4.2, with 3.4.1 missing.

3. When the number of respondents is small, results should be reported in absolute (nominal) values rather than percentages. Percentages are meaningful only for samples of approximately 20–30 participants. Since the expert panel in this study consisted of 17 members, the results should therefore be presented in nominal values rather than percentages.

4. I also observed a few minor punctuation, spelling, and stylistic errors, as well as editorial issues, such as incorrect numbering of figures and tables in the text (for example, Table 10 and Figure 2 in subsection 3.2.3).

Despite these shortcomings, the dissertation is, overall, formally of very high quality.

8. Qualification assessment

In evaluating the overall qualification, I find that the Doctoral Candidate has demonstrated strong general theoretical knowledge in the discipline of management and quality sciences. He has shown the ability to conduct independent scientific and research work. The

overall assessment of the reviewed doctoral dissertation is positive. The dissertation addresses a significant problem of considerable theoretical and cognitive importance and is also highly relevant from a practical point of view.

The Doctoral Candidate has also demonstrated an excellent understanding of the research subject. He conducted both analytical and empirical studies, the results of which contributed to advancing existing knowledge on enhancing competency management processes for knowledge workers in the digital economy era. The final outcome of the dissertation—the **author's original competence model for knowledge workers in the digital economy**— represents a novel solution to a scientific problem.

In conclusion, I unequivocally affirm that, despite the reservations and critical remarks made, the doctoral dissertation of John Muzam fulfills the statutory requirements for doctoral theses as set out in Article 187 of the Act of 20 July 2018, Law on Higher Education and Science (Journal of Laws 2024, item 1571). Accordingly, I recommend that the reviewed dissertation be accepted and approved for public defense.