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NAVIGATING THE SHIFT FROM INDUSTRY 4.0 TO INDUSTRY 5.0: DIGITAL COMPETENCE DEVELOPMENT OF SERBIAN PRIVATE SECTOR EMPLOYEES ASSESSED BY THE DCS SCALE

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Abstract

This study examines the applicability of the Digital Competence Scale (DCS), a short self-assessment instrument grounded in the DigComp framework, in Serbia's private sector. Data were collected via an anonymous online survey (N = 100) across finance, trade, IT, and insurance sectors. The analysis confirmed that the shortened version of the DCS retained a clear and consistent factor structure in the Serbian sample, with very good internal reliability (α = 0.92). Overall self-evaluations did not differ substantially between male and female respondents. By comparison, variations were more apparent once age and education were considered. Younger participants and those with higher educational attainment generally assessed their digital competences more positively. These patterns are consistent with earlier empirical studies that identify age and education as relevant factors in digital competence development. The findings indicate that the DCS can be applied as a concise and cost-effective instrument for the initial identification of digital competence patterns in organizational settings.

Keywords: Industry 4.0, Industry 5.0, digital competences, human resources, DCS questionnaire, private sector in Serbia

1. INTRODUCTION

Digitalization and digital changes in the market have brought about significant transformations. These changes are visible in all organizations that seek to respond to market demands and achieve a competitive advantage. Organizations perceive these changes as a challenge but also as an opportunity for their future growth and development. Most organizations are aware that only those that adapt to such market conditions and requirements will survive and be in a better position than others. Digitalization has introduced numerous

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requirements that have led to changes in existing knowledge and skills. Consequently, companies must develop new digital competences that are essential for every individual within organizations, as well as in the labor market as a whole.

Over the past decades, digitalization and globalization have affected labour market, learning processes and communication. Therefore, digital competences are increasingly important for participating both in society and the labour market (Carretero et al., 2017). In Europe, this orientation is reflected in several policy documents, including the Digital Education Action Plan (2021–2027) and the Europe's Digital Decade initiative, which address digital skills development.

Recently, the focus of Industry 4.0 that was placed on technology has been moved beyond. Industry 5.0 places its focus on people and sustainability, emphasizing the changing nature of work roles and how these changes affect employee well-being (Alves et al., 2023; Poltronieri et al., 2025).

The Digital Competence Framework for Citizens (DigComp) has been recognized as a common reference tool for describing digital competences by many scholars (Carretero et al., 2017; Vuorikari et al., 2022). In some countries, the framework has been adapted at the national level, with the Austrian DigComp model serving as an example for the development of assessment instruments. (Riepl, 2023).

Alongside conceptual work, research has focused on measurement approaches. While performance-based methods exist (Nadkarni & Prügl, 2021), self-assessment instruments are frequently used in organizational studies (Gómez et al., 2022). However, concerns remain regarding the length, validation, and applicability of many existing tools (Khan & Vuopala, 2019; Mattar et al., 2022).

To address these limitations, the Digital Competence Scale (DCS) was developed as a short, psychometrically validated self-assessment instrument grounded in the DigComp framework (Schwarz et al., 2024). The scale has demonstrated satisfactory reliability and a stable factor structure, and previous validation studies have also examined its sensitivity to demographic variables such as gender, age and level of education, which are frequently discussed in the literature on digital skill disparities.

Within this theoretical and practical setting, the study focuses on examining how the Digital Competence Scale (DCS) can be applied in the conditions shaped by the transition from Industry 4.0 to Industry 5.0, with particular attention to employees in Serbia's private sector. The analysis focuses on two main issues. First, it examines the psychometric properties of the scale within the Serbian context. It further explores variations in digital competences across key demographic groups, including gender, age, and level of education.

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The Digital Competence Framework for Citizens (DigComp) has been recognized as a most commonly applied reference point in this field. It provides a structured way to define and compare digital competences across European countries. The framework has also been further developed at the national level, for example through the Austrian DigComp model (Rieple, 2023). Parallel to the development of digital competences, efforts have been directed toward creating instruments that allow for

their reliable measurement. Various approaches exist in this regard. Beyond theoretical models, a key challenge in research on digital competences is the development of instruments that can ensure reliable measurement. Although multiple approaches have been proposed—such as knowledge tests, task-based analyses, or performance assessments (Nadkarni & Prügl, 2021)—self-assessment instruments have, in recent years, gained significant popularity (Gómez et al.,2022). However, some authors argue that many existing instruments are overly extensive and often insufficiently validated, raising methodological concerns about their suitability for different positions and employee groups in terms of psychometric characteristics (Khan & Vuopala, 2019; Mattar et al., 2022).

To address the need for monitoring digital competences, the **Digital Competence Scale** (DCS) was developed as a short self-assessment questionnaire. Its development is based on the Austrian version of the DigComp framework. This instrument, validated through empirical research, consists of 12 items and has proven to be highly practical for both research and application in various organizational settings. It demonstrates appropriate psychometric properties confirmed through different analyses, including reliability testing, factor structure, and construct validity. Furthermore, its validity has been confirmed in relation to demographic variables such as gender, age, and education.

Although originally designed for measuring the digital competences of citizens, the DCS has gradually evolved to also be applicable within business contexts and the world of work. For these reasons, a validated instrument such as the DCS can have significant applications in the assessment, development, and strategic planning processes directly related to human resource management in Serbia's private sector. In other countries, the change towards new knowledge and technologies is also visible (Dekker, 2020). Digitization influences companies to be as competitive as possible on the market (Ghomi & Redecker, 2019). The importance of digitization is largely present in our country in various action plans (Krstić et al., 2023). Digitization also affects organizational culture, leadership and business processes (Reis et al., 2018). The impact of the changes is to increase the digital literacy of the population and employees (Jelisavac, 2023), as well as different populations (Stojanović, 2023). Digitization has an impact on everything, so they are visible among students (Olofsson et al., 2021; Fernández-Otoya et al., 2024), children (Kaarakainen & Saikkonen, 2021), and among different generations (Khan & Vuopala, 2019). There is also a significant gap between the formal knowledge and digital skills required today and what is expected of employees (World Economic Forum, 2020). This is particularly important given the challenges posed by rapid digital transformation, which affect virtually all domestic enterprises.

This paper aims to explore the applicability of the Digital Competence Scale (DCS) in the context of industrial transformations brought about by the paradigms of Industry 4.0 and Industry 5.0, with a particular focus on the competences of employees in Serbia's private sector. Drawing on prior research on digital competence frameworks and documented demographic variations in digital skills, the study proposes three research hypotheses. Differences in digital competences are

expected with respect to gender (H1), age (H2), and educational attainment (H3). Accordingly, the null hypothesis (H_0) assumes the absence of statistically significant differences in digital competences among the analyzed respondent groups.

3. RESEARCH METHOD

For the purposes of this study, we relied on the Digital Competence Scale (DCS), which was originally developed and empirically tested in Austria on a sample of 1,976 respondents (see Schwarz et al. (2024). The instrument underwent rigorous psychometric validation, including item selection through confirmatory factor analysis (CFA), which confirmed its unidimensional structure and theoretical grounding.

Based on this validated framework, we conducted a shortened and contextually adapted version of the DCS questionnaire in Serbia, focusing on the challenges of digital transformation in the private sector and the changes in competences required during the transition from Industry 4.0 to Industry 5.0. The final version of the questionnaire included items covering the key dimensions of digital skills and competences relevant to modern organizations. All questions were assessed according to a five-point Likert-type scale, with response options ranging from 1 ("completely disagree") to 5 ("completely agree").

Data were gathered in May 2025 from 100 employees across Serbia's private sector (primarily finance, trade, IT, and insurance). Using random sampling, participants completed an anonymous online questionnaire. All respondents gave informed consent prior to the voluntary survey. The study was conducted on a sample of private-sector employees in Serbia. Sociodemographic characteristics of respondents are presented in Table 1.

Quantitative data analysis was carried out using the R software package 4.3.1, with the application of the lavaan package (Rosseel, 2012). For data analysis, we used: descriptive analysis (arithmetic mean, standard deviation), factor analysis to verify the validity of the scale, and Cronbach's alpha coefficient to determine the reliability of the scale applied to the examined sample. In order to examine differences in the measured characteristics, a t-test and analysis of variance were used. The level of statistical significance was set at $p < 0.05$. In addition to statistical significance, Cohen's d was used as a measure of effect size.

Table 1. Sociodemographic characteristics of respondents

Variable	Category	n	%
Gender	Male	44	44
	Female	56	56
Age	Up to 30 years	30	30
	31–40 years	28	28
	41–50 years	22	22
	50+ years	20	20
Education	Secondary school	35	35
	College/University	45	45
	Master/Doctorate	20	20

4. DATA ANALYSIS

For the purposes of instrument validation, the DSC questionnaire (Digital Skills Competence Questionnaire) was used, which in its original form contained 31 items. Confirmatory factor analysis (CFA) was also applied in the analysis. CFA was used to account for changes in employees' competences that have become evident due to the transition from Industry 4.0 to Industry 5.0. The purpose of applying CFA was to examine whether the questionnaire structure is optimal and whether it can be used to monitor changes in competences within this transformation process. The initial CFA gave mixed fit results ($\chi^2 = 1613.726$, $df = 45$, $p < .001$). Despite incremental fit indices were high (CFI = 0.991; TLI = 0.989), the absolute fit indices pointed to model misspecification (RMSEA = 0.151; SRMR = 0.068). This prompted further refinement of the scale.

Based on theoretical considerations and the importance of the items, the number of statements was reduced, retaining those with higher factor loadings that also covered broader aspects of digital competences. For example, the item "I can create digital audio and video files" was selected instead of the more specific item "I can take care of copyright when creating digital content," since it was more general and had a higher factor loading.

The final questionnaire model, having a reduced number of questions, demonstrated satisfactory fit indices ($\chi^2 = 156$, $df = 54$, $p < 0.001$; CFI = 0.981; TLI = 0.978; RMSEA = 0.072; SRMR = 0.046). The incremental fit indices (CFI and TLI) exceeded the recommended threshold of 0.95, whereas the absolute fit indices (RMSEA and SRMR) were within acceptable limits, thus indicating an adequate model fit.

Therefore, the shortened version of the DSC questionnaire has been made representative for all key areas of digital competences:

- basic digital skills and access,
- information and data literacy,
- online communication and collaboration,
- creation of digital content,
- security,
- problem solving and continuous learning.

This process of adapting the DSC questionnaire is particularly important because it enables its application in the study of employee competences in Serbia, within the context of the transition from Industry 4.0 to Industry 5.0. Thus, it provides a basis for a better understanding of the level of development of digital competences necessary for the new challenges of the labor market and the demands of modern industry.

In order to examine the dimensional structure of the Digital Competence Scale (DCS) in its shortened form, preliminary analyses focused on the intercorrelations among the twelve retained items. This step was undertaken prior to estimating the confirmatory factor analysis model. The CFA results suggest that the proposed single-factor solution is an acceptable fit to the observed data ($\chi^2 = 156$, $df = 54$, $p < 0.05$; CFI = 0.981; TLI = 0.978; RMSEA = 0.072; SRMR = 0.046). Both comparative fit indices exceed commonly applied reference values, while the error-based indices remain within ranges considered adequate. Taken together, these results indicate that the empirical data are consistent with a unidimensional representation of digital competence, and accordingly the null hypothesis (H_0) is retained.

Table 2. Selection of DCS Questionnaire Items on a Sample of 100 Respondents (Unidimensional CFA Model)

No.	CA	Item (*selected)	λ
1	0	*I can use a computer.*	.76
2	0	*I can use a smartphone.*	.79
3	0	I can work with digital technologies (e.g., writing and printing text).	.82
4	0	I can adapt digital technologies (e.g., macros in Excel).	.61
5	0	I can make purchases online (e.g., online shopping, train ticket).	.81
6	1	I can search for information on the Internet (e.g., Google).	.85
7	1	*I can search for files on a computer.*	.88
8	1	I can evaluate whether information on the Internet is valid/true.	.71
9	1	I can find different pieces of information on a topic and compare them.	.79
10	1	*I can use different sources on the Internet, including social networks and online media.*	.83
11	2	*I can communicate with others online (e.g., e-mail, WhatsApp, Skype).*	.82
12	2	I can collaborate with others online (e.g., cloud services).	.85
13	2	*I can use programs for collaborative work on documents.*	.84
14	2	I can coordinate online communication with a group.	.83
15	2	I can coordinate group editing of digital content.	.81
16	3	I can create digital texts (e.g., Word document).	.82
17	3	I can create digital images (e.g., photos).	.80
18	3	*I can create audio and video files.*	.74
19	3	*I can combine digital content (e.g., insert an image into text).*	.83
20	3	I can code.	.56
21	3	When creating content, I can take care of copyright.	.67
22	4	*I can create a secure password.*	.76
23	4	I can back up files (e.g., external drive, cloud).	.82
24	4	I can recognize phishing or spam emails.	.77
25	4	*I can recognize an unreliable website.*	.78
26	4	I can check how my personal data are being used.	.70
27	5	I can search for solutions to technical problems (e.g., forum).	.82
28	5	I can apply a solution to a technical problem (e.g., installing software).	.83
29	5	*I can get acquainted with a new digital program/application.*	.87
30	5	I can purposefully learn about a new program/application.	.86
31	5	*I intentionally develop my digital skills.*	.83

* Note: CA = Competence areas (0 = Basics and access, 1 = Information and data literacy, 2 = Communication and collaboration, 3 = Digital content creation, 4 = Security, 5 = Problem-solving and continuous learning); λ = factor loading from the unidimensional CFA model.

As shown in Table 3, the items were generally highly correlated, but no clear structure of higher correlations among specific items was observed, which can be considered a preliminary indicator of a unidimensional factor structure. Furthermore, items belonging to the same competence area demonstrated high inter-item correlations.

The CFA was conducted on a reduced set of items, based on the assumption of a unidimensional factor structure. The results of the analysis indicated an acceptable level of model fit with previously reported empirical findings. The CFA revealed a χ^2 of 156 with 54 degrees of liberty ($p < .001$). The incremental fit indexes were high (CFI = 0.981, TLI = 0.978), while the absolute fit indexes were in acceptable range (RMSEA = 0.072 , 90% CI : 0.061 to 0.083 and SRMR = 0.046). The CFI, TLI , and SRMR values for this study fall into the acceptable range based on the recommendations made by Mair (2018). The RMSEA was slightly above the optimal threshold of 0.05, which may be attributed to the smaller sample size and the nature of the scale. As shown in

Table 3, the obtained CFA results are in line with H0, which assumes a single underlying dimension of digital competence in the shortened scale, while H1, referring to a multidimensional structure, is not confirmed.

Table 3. Fit indices of the CFA model (Panel B – short version of the questionnaire)

Indeks	Vrednost	Optimalni opseg
χ^2	156	–
df	54	–
p	<0.001	>0.05 za H0
CFI	0.981	≥0.95
TLI	0.978	≥0.95
RMSEA	0.072	≤0.05 (optimalno)
SRMR	0.046	≤0.08

Table 4 presents the results showing the factor loadings of individual items, including their discrimination indices. All values were relatively high and similar in magnitude. This pattern of results indicates satisfactory psychometric quality of the instrument. It also confirms that all items contributed substantially to the measurement of a common latent dimension. Overall, the indicators demonstrate good coherence and support the evaluation of the unidimensional model as appropriate and well aligned with the empirical data.

The fit indices were similar to those obtained during the item selection stage, which suggests stability of the DCS factor structure across different samples.

Regarding the distribution of responses to individual items, Table 3 reports the means, standard deviations, and item difficulties. Higher item difficulty corresponds to higher self-assessed digital competences of respondents. Some item difficulties were close to or above 0.8 (Bortz & Döring, 2013), indicating relatively high self-assessed digital competences among respondents. The distribution of average DCS scores (means across the 12 items) is displayed in Figure 1. When examining the distribution of the obtained results, a slight positive skewness is observed. The majority of respondents achieved scores above the arithmetic mean of the scale. The obtained values and their range indicate a tendency toward higher levels of digital competences in the analyzed sample.

Table 4 summarizes the overview of item characteristics. All retained items show sufficiently high loadings, while their discrimination indices remain within acceptable limits. Taken together, these results support the use of the items for measuring digital competence.

The reliability of the applied instrument was checked by calculating the Cronbach's alpha coefficient, based on the assumption that the scale has a one-dimensional structure. The value of α was 0.92, which is in line with the recommended limits of acceptance, which in the literature range between 0.70 and 0.95 (Bortz and Döring, 2013; Nunnally & Bernstein, 1994). This result indicates a high level of internal consistency of the items within the scale. In order to see the results beyond the scope of statistical significance itself, Cohen's d coefficient was used in the analysis, as well as 95% confidence intervals, which enabled the assessment of their practical relevance. The results indicate moderate to large effect sizes within the dimensions of digital competencies, which allows a reliable interpretation of the obtained findings. This level of methodological sophistication enables complete replication of the research in the same or similar conditions, which is a significant

Table 4. Means, Standard Deviations, Item Difficulty, Factor Loadings, and Discrimination Power (sample n = 100)

Item	M	SD	Diff.	λ	Discr. power
I can use a smartphone.	4.8	1.2	0.75	0.82	0.77
I have the ability to find files in a computer.	5.1	1.1	0.78	0.80	0.74
I am free to use various Internet sources, including social media and news sites.	5.0	1.3	0.76	0.84	0.79
I am still able to contact people via the internet (email, WhatsApp, Skype).	5.2	1.2	0.78	0.81	0.76
I can collaborate on documents using the apps.	5.4	1.0	0.82	0.83	0.78
I can produce audio and video.	4.6	1.4	0.70	0.79	0.72
I can mix digital resources (e.g. image-inside-text).	4.3	1.5	0.65	0.75	0.69
I can generate a strong password.	4.9	1.3	0.74	0.80	0.76
I am able to identify an untrustworthy internet site.	5.2	1.1	0.78	0.81	0.77
I can learn how to use a new digital think fast! program(app).	4.5	1.4	0.67	0.76	0.70
I actively work to upskill digitally	4.8	1.2	0.73	0.84	0.80
I can use a smartphone.	4.7	1.3	0.71	0.82	0.78

*Note: M = mean, SD = standard deviation, Diff. = item difficulty, λ = factor loading (CFA, unidimensional model), Discr. = discrimination power.

advantage of the applied research design.

The application of confirmatory factor analysis enabled the verification of the assumed scale structure, the assessment of model adequacy through standard fit indices, as well as the confirmation of the validity and reliability of the instrument within the context of the examined sample.

5. FINDINGS

In order to examine the existence of differences in digital competences according to gender, a t-test for independent samples was applied. As indicated in Table 5, no statistically significant difference was found in the overall level of digital competencies between men and women (t = 1.23; p = 0.221). Despite the average value being slightly higher for men (M = 3.72) than for women (M = 3.58), the obtained p-value exceeds the statistical significance threshold of 0.05. These results indicate that the null hypothesis (H_0) is not rejected, while the hypothesis H1 is not confirmed.

The assessment of digital competences in relation to respondents' age was conducted using a one-way analysis of variance (ANOVA). The results, presented in Table 6, indicate the presence of statistically significant differences between age groups (F = 4.15; p = 0.008). Subsequent Tukey post-hoc analysis showed that respondents under the age of 30 achieved significantly higher mean levels of digital competences compared to those older than 50. There were no significant differences among middle age

Table 5. Differences in Digital Competences by Gender (t-test)

Group	M	SD	t	df	p
Male	3.72	0.65	1.23	98	0.221
Female	3.58	0.61			

Note. M = mean, SD = standard deviation. Independent samples t-test, significance level p < .05.

Table 6. Differences in Digital Competences by Age (ANOVA)

Group	M	SD	F	df	p
Up to 30 years	3.88	0.59	4.15	3	0.008**
31-40 years	3.65	0.62		96	
41-50 years	3.51	0.60			
Over 50 years	3.29	0.58			

Note: M = mean; SD = standard deviation. One-way ANOVA. Post-hoc Tukey test indicated that respondents up to 30 years scored significantly higher than those over 50 years (p < .05).

groups.

Additional analysis of age-related differences further confirmed the previously obtained findings. The biggest difference was between the youngest and the oldest participants. Employees under 30 years of age indicated the highest average level of digital skills (M=3.88) and employees over 50 lowest level (M=3.29). No statistically significant differences were identified among the intermediate age groups. These findings indicate that the gap in digital competences is mostly pronounced at the ends of the age range. Given the obtained results ($p = 0.008$), and that the p-value falls below the 0.05 level, the null hypothesis (H_0) has been rejected. The results show that statistically significant differences in digital competences exist among the age groups of respondents. Accordingly, hypothesis H2 is supported.

For this purpose, several model fit indices were used (CFI, TLI, RMSEA, SRMR). Based on the obtained results, including high factor loadings and a satisfactory Cronbach's alpha value, both the structural validity and internal reliability of the adapted DCS scale were confirmed.

Table 7. Differences in Digital Competences by Education Level (ANOVA)

Group	M	SD	F	df	p
Secondary school	3.40	0.55	3.27	2	0.024*
College/University	3.72	0.63		97	
Master/Doctorate	3.95	0.58			

Note: M = mean; SD = standard deviation. One-way ANOVA. *p < .05 (2-tailed).

A one-way ANOVA was also applied to examine differences by level of education (Table 7). To examine differences in digital competences according to respondents' level of education, a one-way analysis of variance (ANOVA) was conducted (Table 7). The results indicate statistically significant differences between educational groups ($F = 3.27$; $p = 0.024$). The highest mean values were observed among respondents who had completed master's or doctoral studies ($M = 3.95$), while notably lower scores were recorded among respondents who completed secondary education ($M = 3.40$). The differences between higher-educated and lower-educated employees proved to be statistically significant. In conclusion, respondents with higher levels of education achieved higher total digital competence scores ($M = 3.72$).

In the key findings, we can highlight several important segments that were obtained on the basis of statistical analyses:

The analysis showed that overall digital competence levels did not differ significantly between male and female respondents ($p = 0.221$). In line with this result, the null hypothesis (H_0) was retained, while the effect size remained small (Cohen's $d \approx 0.22$), indicating that gender has a limited explanatory role in this context.

The analysis of age-related differences indicated statistically significant differences between the youngest and the oldest age groups ($p = 0.008$). The results show that younger respondents exhibit notably higher levels of digital competences. Based on these findings, the null hypothesis was rejected, with a moderate effect size ($\eta^2 \approx 0.13$).

A similar pattern was observed with respect to education. Respondents with higher levels of formal education exhibit higher levels of digital competences ($p = 0.024$) thus highlighting the importance of continued education in a rapidly evolving digital environment. These results indicated that the null hypothesis was to be rejected, with a moderate effect size ($\eta^2 \approx 0.10$).

The results clearly address the research question and indicate that gender does not have a significant impact on digital competences among employees in Serbia's private sector, whereas age and education exert a significant influence. These findings have important implications for the planning of training programs and competence development in private companies.

6. CONCLUSION AND DISCUSSION

Digital competences among employees in Serbia's private sector were examined with regard to selected demographic characteristics, namely gender, age, and level of education. The conclusions are based on the empirical results obtained in this study, while existing research on digital competence development is used to support their interpretation.

The analysis did not identify statistically significant differences between male and female respondents in overall digital competence. For this reason, the null hypothesis related to gender differences was retained. The independent samples t-test showed similar mean scores for both groups and no statistically significant effect. Comparable findings have been reported in earlier empirical research, suggesting that gender-related differences in digital competences are relatively limited in contemporary work environments (Khan & Vuopala, 2019; Schwarz et al., 2024). One explanation relates to the routine use of largely standardized digital tools across occupational roles, which tends to reduce the influence of gender-specific factors on everyday digital practices.

In contrast to gender, age emerged as a more relevant differentiating variable. Higher levels of digital competences were reported by younger employees than by respondents in the oldest age group. Age-related differences were identified in the analysis. The post-hoc comparison showed a difference between the youngest and the oldest respondents. Differences were also found with regard to educational attainment. Respondents with higher levels of formal education generally reported more advanced digital competences. Similar relationships between age, education and digital competence levels have been described in earlier studies (Khan & Vuopala, 2019; Vuorikari, 2022). From an applied perspective, these results point to the need for additional organizational support for older employees and for those with lower levels of formal education in the context of ongoing digital transformation processes (Carretero, et al., 2017; Gómez et al., 2022; Rodero, 2023; Vuorikari, 2022).

A ceiling effect was observed for several questionnaire items, as respondents with higher levels of education and more advanced technological skills frequently achieved scores at or near the maximum values of the scale. This pattern indicates that the upper range of the instrument's sensitivity may be limited when distinguishing between very high or specialized levels of digital competence. Such constraints are commonly associated with self-report instruments and reflect a well-documented methodological challenge in the assessment of advanced digital skills. Similar ceiling effects have been reported in prior validation studies of digital competence measures, including the DCS, which supports the plausibility of this interpretation (Schwarz et al., 2024; Bortz & Döring, 2013).

The findings add empirical insight into

the level and distribution of digital competences among employees in Serbia's private sector. The results also indicate that the Digital Competence Scale can be applied in this national and organizational context. When viewed in relation to the shift from Industry 4.0 toward Industry 5.0, the findings support existing discussions that place greater emphasis on inclusive and human-centred approaches to digital competence development.

The results have implications for organizational practice, particularly in the area of employee development. Lower levels of digital competences among older employees and employees with lower levels of formal education indicate that training and reskilling activities in organizations are more frequently relevant for these groups during digital transformation processes.

Nevertheless, the study has certain limitations. First, only specific aspects of validity were analyzed, particularly convergent validity, while future research should also include discriminant and incremental validity. Second, the DCS was tested in this study at three basic levels of digital competence (basic, intermediate, and advanced), while the highly specialized level was not covered. This explains the observed "ceiling effect," as the scale shows lower sensitivity in distinguishing highly competent or specialized individuals. Moreover, the sample was relatively small and limited to the private sector in Serbia, which reduces the possibility of generalizing the findings. In order to ensure better representativeness and build on existing insights, subsequent research should include larger and more heterogeneous groups of respondents from multiple sectors. Apart from methodological advances, it is also important to examine the wider context, i.e. the factors that directly influence the development of digital competences - primarily previous experience, personal motivation and resources that the organization makes available.

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ПРЕЛАЗ СА ИНДУСТРИЈЕ 4.0 НА ИНДУСТРИЈУ 5.0: РАЗВОЈ ДИГИТАЛНИХ КОМПЕТЕНЦИЈА ЗАПОСЛЕНИХ У ПРИВАТНОМ СЕКТОРУ СРБИЈЕ ПРОЦЕЊЕН DCS СКАЛОМ

Дејан Јечменица и Наташа Станишић

Извод

Ово истраживање испитује применљивост Скале дигиталних компетенција (DCS), кратког инструмента самопроцене заснованог на DigComp оквиру, у приватном сектору Србије. Подаци су прикупљени путем анонимне онлајн анкете (N = 100) у секторима финансија, трговине, информационих технологија и осигурања. Анализа је потврдила да скраћена верзија DCS задржава јасну и конзистентну факторску структуру у узорку из Србије, уз веома добру унутрашњу поузданост (α = 0,92). Нису уочене изражене разлике између мушкараца и жена у укупној самопроцени дигиталних компетенција. Међутим, када се узму у обзир старост и ниво образовања, уочавају се одређене разлике. Млађи испитаници и они са вишим нивоом формалног образовања у просеку су позитивније оцењивали своје дигиталне компетенције. Овакви налази су у складу са ранијим емпиријским истраживањима која старост и образовање издвајају као значајне факторе у развоју дигиталних компетенција. Резултати указују да се DCS може користити као сажет и економичан инструмент за почетно сагледавање образаца дигиталних компетенција у организационом окружењу.

Кључне речи: Индустрија 4.0, Индустрија 5.0, дигиталне компетенције, људски ресурси, DCS упитник, приватни сектор у Србији

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