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ORGANIZATIONAL DIGITAL DEVELOPMENT AND DIGITAL COMPETENCIES REQUIRED FOR MANAGERS IN DIFFERENT POSITIONS: THE HUMAN RESOURCE MANAGEMENT PERSPECTIVE

Digitalni razvoj organizacije i očekivane digitalne kompetencije menadžera na različitim pozicijama: perspektiva menadžera ljudskih resursa

ABSTRACT: *Organizational digital development requires new competencies from managers. The aim of the research was to establish the relation between the assessed level of the companies` digitalization and the assessment of the required level of digital competencies for managers in different managerial positions (operational, middle, and executive). The respondents included 97 professionals employed in a human resource department who filled an online scale the digital development level in companies and a modified scale based on the European digital competence framework. The results show that the higher assessment of the organizational digital development predicts the higher level of required digital competencies, regardless the managerial position, followed by the main effect of the managerial position on the required level of digital competencies, with no differences in competency domains. They indicate the importance of the organizational setting in the context of the expected digital competency, as well as the existing differences in the level but not in the domain requirements for competencies related to the managerial position. Findings should be interpreted in the context of the limitations stemming from the sample and the fact that both assessments were carried out by the same respondents who might not be the experts in organizational digital development.*

KEY WORDS: *digital development of the company, digital competencies, managerial positions*

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APSTRAKT: *Digitalni razvoj organizacija zahteva i odgovarajući nivo digitalnih kompetencija menadžera. Cilj istraživanja je da se utvrdi povezanost stepena digitalizacije organizacije i procene potrebnog nivoa digitalnih kompetencija menadžera s obzirom na poziciju na kojoj se nalazi (operativna, srednja ili rukovodeća). Ispitanike je činilo 97 stručnjaka zaposlenih u sektoru upravljanja ljudskim resursima koji su elektronskim putem procenjivali stepen digitalnog razvoja organizacije na skali konstruisanoj u te svrhe i upoređivali potrebne nivoe digitalnih kompetencija za menadžere na različitim pozicijama modifikovanom skalom zasnovanom na Evropskom okviru digitalnih kompetencija. Rezultati su pokazali da viša procena digitalnog razvoja organizacije predviđa i potrebu za višim nivoom svih digitalnih kompetencija bez obzira na menadžersku poziciju, kao i da postoji glavni efekat nivoa na kom se menadžer nalazi s obzirom na očekivani nivo digitalnih kompetencija, ali da ne postoje razlike u pogledu domena kompetencija. Nalazi mogu ukazivati na značaj organizacionog okruženja u kontekstu potreba za digitalnim kompetencijama, kao i na postojanje razlika u stepenu ali ne i u vrsti kompetencija s obzirom na menadžersku poziciju. Nalaze treba sagledati u svetlu ograničenja koje nameće specifičnost uzorka i činjenice da su obe procene vršili isti ispitanici koji ne moraju da budu eksperti u proceni digitalnog razvoja organizacije.*

KLJUČNE REČI: *digitalni razvoj kompanije, digitalne kompetencije, menadžerske pozicije*

1. Introduction

Technological development is transforming how business functions operate, and organizations are facing rapid transformation in all work and life domains. The causes of economic and social changes are seen in the fact that we are witnessing the 4.0 industrial revolution, or, simply called Industry 4.0. Living and working in this era implies a loss of boundaries between societal segments while digitally mediated, created, and shared information reach and influence various stakeholders and actors networked in one dynamic but sustainable system.

In the work life context, business becomes digitalized even in less technological industries and less developed countries. Pervasive usage of technology initiates the necessity for new practices to emerge and new competencies to be acquired among current and future employees. For example, traditional organizational structures are no longer viable. "Flexible and networked cross-location teams" became widespread, enabling integration of external workforce in the freelancer`s role (Nadkarni & Prugl, 2021). Concepts of digital transformation and digital workforce are intersected and based on the digital competencies of employees.

These processes are accelerated by COVID that provoked an emergent and inevitable transition into a virtual modality of existence (Gartner, 2020). Some of these practices remain even after the relative normalization of life. For example, employees continue working from home, in a remote or hybrid work modality (Tramontano, Grant & Clarke, 2021), turning to self-employment work arrangements (Grobman & Joia-Luiz, 2022). Although these changes are not novel

and instant, businesses, companies, and the workforce cohorts are not all equally prone to integrating their activities with technology. For example, industries like media or publishing are more agile compared with the oil industry (Nadkarni & Prugl, 2021). At the same time, the labor market is facing the demands for new skills and individual careers are coming to the point of unavoidable adjustments. Statistical data show that business might be slower in technological acceptance than individual users who are more agile (Delloite, 2017). Nevertheless, there are still many employees struggling with new work practices introduced by the latest technologies.

To achieve the desired level of digital transformation, employees need to embrace new work attitudes and to acquire suitable skills. Thus, they are expected to go through training, upskilling and reskilling processes (Circova & Blstakova, 2023). Researchers found a link between the so called digital maturity (Oberlander, Beinicke & Bipp, 2020) of the company and the level of digital skills, some of them claiming that a higher level of the employees` digital skills may raise the level of the company`s digital transformation (Mazurchenko & Svermova, 2021; Zentner, Spremic & Zentner, 2022; Sousa & Rocha, 2019). Authors see digital literacy of employees as one of the organizational affordances of digital transformation (Cetindamar Kozanoglu & Abedin, 2021). It was found that management digital skills have a positive impact on the digital business maturity models (Zentner, Spremic & Zentner, 2022). The importance of management in any organizational change process is well known, because of their specific role in the organization and the potential influence they might have on most personnel. Although it is expected from their role to demonstrate different competencies, their skills in using technology in a proper and safe way are crucial and expressed in their work behavior enabling HR experts to recognize them. Nevertheless, these skills might have different effects in various levels of managerial positions, while their impact varies from a role model to the implementer's role. According to the role and position, their own levels of readiness to use required skills should be taken into consideration too. So, the main research problem considers the relation between organizational change in the context of technological development and a modified workforce competency demand that affects managerial positions. Their specific role and salient position might vary due to its concrete managerial level.

2. Theoretical background

Organizational changes are always challenging for managers, but it seems that digital transformation is the most invasive one, encompassing two domains: technology and people (Nadkarni, & Prugl, 2021) and their congruency. Although it is initiated by a technologically improved business, it becomes more of a human experience issue. The transformative effect is never directly caused by digitalization, it just makes it possible, as digital transformation is change "triggered by digital technologies" (Hess, et al., 2016). Verhoef and colleagues (Verhoef, et al., 2021) identified three external factors initiating digital transformation. The spreading of World Wide Web and related technologies

enabled competition to become global and intensive and customers reacted by migrating their activities online. There are various digital business models based on the components of content (digital information), experience and platform (internal and external technologies and data) indicating development and maturity of the organization (Zentner, Spremic & Zentner, 2022). Changes are inevitable in the task structure, job roles, and workplace requirements (Nadkarni & Prugl, 2021).

2.1. Digital workplace and workforce

Starting from a simple usage of different technological tools to perform activities, toward encoding analog information into a digital format, transforming each activity into a digital task, we came to the point where information and technology have the central role (Verhoef, et al, 2021). Today digital technologies 4.0 include more serious tools with a higher range of influence. They are combinations of information, computing, communication, and connectivity technologies including artificial intelligence (AI), big data, cloud computing, Internet of things (IoTs), block chain technologies (Lee & Meng, 2021).

Digitally functional organization is viable in the context of capability to practice routines and achieve desired outcomes. It does not just create new tasks or undermine the current non-technological sound, but it changes the way some existing work activities are practiced (Vazquez, et al., 2019). To make it possible it is necessary to raise the overall digital competency of personnel. So, one important indicator of digital transformation might be seen in the critical mass of the employees' adeptness to use technology and the level of their digital readiness (Lee & Meng, 2021). The authors advocate that proper strategy and its compliance with organizational structure, investment in technology and change in culture should be achieved (Marnewick & Marnewick, 2021).

The concept of workforce digital maturity refers to the nature and degree of digital competencies required or possessed among employees that support normal functioning and effective performance in the organization (Oberlander, Beinicke & Bipp, 2020). Nadkarni and Prugl (2021) see digital workforce as "adaptive, compliant, imaginative, predictive and location-independent" (p. 258).

The authors create different general and context-relevant frameworks for digital competencies. A framework, or systems of competencies should reflect the ability of the a person to solve a class of problems (Gitelman, et al., 2022), and one of the most popular models is KSAO, used as the theoretical reference that includes knowledge, skills, and opportunities (Avitia-Carlos, et al., 2019). Campion and colleagues (Campion, et al., 2020) point to the gap between existing theoretical competency frameworks on one side, and actual skills required in a digitally influenced business. Nadkarni and Prugl (2021) remark that digital transformation may also create a gap between younger, inexperienced but digitally literate, and older, experienced workers with less digital competencies. He advocates that it can be overcome by creating a learning-friendly culture. Accordingly, there are some endeavors to analyze the competency requirements from the labor market to adjust the University curricula (Labrović, et al., 2022).

In the scope of the following research, we are focusing on the concept of digital competences. Ferrari and Punie (2013: 84) define them as a: "set of knowledge, skills, attitudes, abilities, strategies and awareness that is required when using ICT and digital media to perform tasks; solve problems; communicate; manage information; behave in an ethical and responsible way; collaborate; create and share content and knowledge for work, leisure, participation, learning, socializing, empowerment and consumerism". This definition is wide, covering almost all human activities and implying the pervasiveness of the phenomena. The work context is one of them and we are focusing on the narrower definition of these competencies as "the ability to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately through digital technologies for employment, decent jobs and entrepreneurship" (Law et al., 2018: 6). To assess and develop these behaviors, it is necessary to create an operable framework for professional learning and development.

The traditional concept of the competency framework for managers is surpassed by new, more suitable conceptions and classic competency frameworks must be enriched with technological skills. Shet and Pereira (2021) use content analysis of a large number of relevant studies extracting managerial competencies for Industry 4.0, adding to the list technological competencies (technology architecture, and data analytics). These skills relate to digital intelligence (Park & Gentle, 2019) and modeling represented the integration of industry 4.0 (computer production systems) with AI, big data, and cloud computing. Managerial work is now enriched with complex information systems overwhelming managers with large datasets (Gitleman, et al., 2022). Frank and associates (2019) advocate that implementing industry 4.0 in the domain of managerial activities categorize the requirements for skills into operational management, people management and technology integration, while Marnewick and Marnewick (2021) included cyber security. Based on the general framework of digital competencies Gitleman and colleagues (Gitleman, et al., 2022) developed their taxonomy of basic digital competencies for managers.

3. Research problem

Zentner and associates (Zentner, Spremić & Zentner, 2022) insist that leadership is the most important motivator of successful digital transformation. Authors, paraphrasing Borowska, impose to leaders the task to develop and implement a strategy to provide the development of skills for adjusting to the digitalized context and actively using organizational digital tools. To develop an adequate digital leadership capacity, managers need to achieve a certain level of digital literacy, involving the mastery of relevant technical language concepts. This implies that company management should present specific know-how about digital technologies and business models. They need to embrace the integrative nature of working processes and to change the business attitude in order to function in this, as Shet and Pereira (2021) call it, complex ecosystem. It is important to remark that there is evidence of the gap between expectations and reality of technical skillfulness of managers (Lee & Meng, 2021).

Oberlander and colleagues (Oberlander, Beinicke & Bipp, 2020) remarked that there is no unique model of systematizing required dimensions with overlapping categories and offered one coherent framework. Twenty-five categories of digital competencies are extracted referring to affiliated knowledge, skills, and abilities. It encompasses the handling of software and hardware, programming, handling of applications, innovative capability and creativity, information processing (recognizing knowledge gaps, search, data analysis, evaluating), data organization, effective usage, communication, collaboration, networking, netiquette, sharing data, cultural aspects, security and law, responsibility, goals and motivation, willingness to learn and openness, ethics and morale, autonomy and independence, problem solving and training and educating others.

Mattar and colleagues (Mattar, Ramos & Lucas, 2022) provided a comprehensive literature review of seven relevant digital competence frameworks widely used in the studies of competencies in the domain of citizens, students, and educators. They analyzed research based on their scope, methodology and instrument creation. Most instruments applied are constructed and based on the structure offered by the European Digital Competence Framework (Carretero, Vuorikari & Punie, 2017) created for the purposes of assessing digital competencies in five domains, descriptions of each competence and four or eight proficiency levels. While some authors are focusing on creating new concepts of e-leadership, like Roman`s six E-competency model (Roman, et al., 2019), focusing on effective virtual communication, others warn of technocentric managers (Shet & Pereira, 2021) advocating technologically driven interdisciplinarity (Reis de Macedo et al, 2023). For example, Gitleman and colleagues (Gitleman, et al., 2022) developed an interdisciplinary competency framework for managers in a digital work environment leaning on DigComp. They combined basic digital skills with traditional managerial activities. In the domain of information search and validation, they identified the skill of organizing information. In the communication domain creating communication networks becomes important as well as using correct conceptual language and knowledge exchange. In this model, virtual teams focus on the collaboration process, and on innovation and sharing ideas. In the third level of the virtual team's competency, they manage communication and the ability to create and work in different interdisciplinary teams. Competencies at the 4th level cover platform usages to generate and promote innovative ideas and to develop and present management decisions. The fifth level of competencies considers using information and communication technologies and predictive analytics to solve complex problems under uncertainty, multifactor decision evaluation, and development of organizational flexibility.

3.1. Research goals and objectives

In this research we are starting from the idea that there might be a link between assessed levels of organizational digitalization, and the level of required digital competencies of management personnel at different managerial positions:

supervising (operational), middle (administrative) management and senior manager functions. As different industries develop technically at a different pace, we did not take into consideration these differences, expecting that the level of the perceived degree of digitalization of business processes are the context in which digital competencies are required.

Some authors focused on HR managers implying that their role in digital transformation is even more crucial than it is the case with other managerial positions. Nankervis and Cameron (2023) say that they are in charge of creating new performing strategies, focusing on reskilling, upskilling, and the rearrangement of personnel, trying to find the right alternative path and work model in the context of automation, AI and other technological changes. The authors found that training for managers is the most challenging activity in the process. To prepare employees for "skillful transformation" (Čirčová & Blštáková, 2023) they need to train themselves too. Digital competencies of HR managers are also important, but they are out of the scope of this research and their digital knowledge is relevant in their evaluator`s role. Also, the Covid experience brought some new challenges to human resource practices that have become almost impossible without proper digital skills needed for those working from home or in a hybrid regime (Milikić, Mirić & Janićijević, 2023). Being in charge of the employees` selection, training and development, while responsible for facilitating any kind of organizational transformation, human resource specialists are seen as the key respondents for getting insight into the topic. The first step toward bridging the potential gap between current and desired competencies of personnel might be in identifying the level of digital competencies that are eligible in the context of the level of the company`s digitalization process. Also, it is believed that this approach might limit the subjectivity of a competency self-assessment.

The main goal of our research is to analyze the relation between assessed organizational digital development and requirements for digital competencies (information and data literacy, content creation, communication and collaboration, safety, and problem solving) from managers in different hierarchical positions (operational, middle, executive) from the perspective of human resource managers that oversee employee selection and training in the domain and within organization.

The objectives cover the assessment of the: (1) organizational digital development, (2) required digital competencies, (3) relation between perceived digital development of an organization and digital competencies` requirements, and (4) difference in the required level of digital competencies between three managerial levels.

3.2. Research hypotheses

Based on previous studies that show a positive link between the level of organizational digital development and the employees` digital competencies (Oberlander, Beinicke & Bipp, 2020), we believe that these two processes are highly intervened and provoked by the same "force" of technological development that impacts both the workplace and the workforce (Park, 2019).

This might be the reason why studies could not come to a conclusion about the direction of the impact resulting from the organizational environment`s transformation and transforming the employees` competencies, implying mutual impact. Nevertheless, some authors find the primacy of the employees` skillfulness over the workplace transformation (Mazurchenko & Svermova, 2021; Cetindamar Kozanoglu & Abedin, 2021). Here, we expect the reverse effect. We hypothesized that:

> H1: There will be a positive effect of the assessed organizational digital development on digital competency requirements.

Although scholars concur with the importance the managerial function has in digital transformation, and with the fact that managers` digital competence is non-negligible, it is not often clear how it varies on different managerial positions. Some studies focus on digital competencies of managers and their different organizational roles (Zentner, Spremic & Zentner, 2022). For example, Gitleman (Gitleman, et al., 2022) defines competencies for lower, middle, and top managers in his framework, defining different goals when acquiring expected competencies. For example, managers at the bottom line have a goal to acquire the systems` basics, while middle managers should be able to solve non-standard problems, and top managers to integrate all activities, solve complex problems and organize transformations at the highest level.

It inspires the second hypothesis:

> H2: There will be a significant difference between three managerial positions in the assessed levels of required digital competencies.

Further, operational managers are usually technically equipped and in the immediate contact with employees, while top managers are figures of authority and role models, as well as inspirers of digital transformation. The function of middle managers should not be neglected. As a matter of fact, they are the executors of most decisions related to digitalization. There is a lack of literature focusing on this organizational position, but Natkarni and Prugl (2021) believe that they are the heart of transformation due to their administrative role and claim that they are the mediators for communicating changes. To be able to do their role in the new, virtually imposed context, they need to develop a lot of digital skills and learn to manage digital tools. Despite this, there were some concerns about their role that might be extinguished and replaced by artificial intelligence. It is expected that they will neglect administrative tasks and focus more on leadership. Also, their position in the communication chain directs them from controlling (no longer) static processes and people toward being in a middle of the system of relations, as the locus of connection between networked employees. Thus, their role goes toward enabling and supporting employees to use digital tools, becoming more strategically oriented. Bearing in mind their fear of losing routine and becoming surplus making them unsupportive of transformation (they have to facilitate), there is an advice to pay special attention to their digital skills assessment.

In the context of previous studies that suggest that middle managers are in charge of networking and communication using digital technologies (Nadkarni & Prugl, 2021), it is expected that:

> H2.1. Middle managers will have higher demands for digital competencies compared with the other two groups.

4. Methods

Research was conducted in 2021, via platforms for social networking and sending links to e-mail addresses, primarily using LinkedIn as a tool or a source of potential respondents` information and electronic addresses, as well as personal contacts and databases of human resource professionals. Although this procedure does not guarantee anonymity, the respondents were aware of the study purposes, and they provided consent to answer the questions. HR managers are chosen based on their organizational role and insight they have in the domain of competency requirements. Removing the idea of assessing a concrete employee and just focusing on impersonal subjects and, competency protagonists, we tried to make the process more objective.

4.1. Research procedure

The invitation for filling out the questionnaire with a link to the Google form questionnaire was sent to 453 addresses found in databases of human resource professionals, along with the cover letter explaining the purpose of the study. After collecting the responses and extracting non-valid answers, 97 respondents` qualified for data analysis. The procedure consisted of HR expert respondents making one assessment of the company and three assessments of required digital competencies for three management positions.

4.2. Instruments

The first variable, the level of the company`s digital development, is measured by seven items on a three-degree scale (not present at all/present in some amount/fully present) developed for the purposes of previous studies (Kovačević, et al., 2019). The seven items represent seven indicators of digitalization in organizational context: (1) budget and resources appointed to digitalization, (2) existence of a clear digitalization strategy, (3) presence of external digitalization experts, (4) digital technologies for product improvement, (5) business process integration management tools, (6) frequent usage of communication and collaboration tools, and (7) inclusion of assessing digital competencies in the selection process.

The assessment of digital competencies of employees` was based on the European Digital Competence Framework (DigComp) (Carretero, Vuorikari & Punie, 2017) that consists of five digital competency domains covered by 21 competencies. Domains are the following: (1) information and data literacy,

(covered with 3 questions: searching, evaluating and managinig data), (2) communication and collaboration (6 questions: interacting, sharing, engaging, collaborating, netiquette and online identity), (3) content creation (4 questions: developing, integrating, copyright and programming), (4) safety (4 questions: device, personal data/privacy, health and environment protection) and (5) problem solving (4 questions: technical, identifying needs and resources, creative usage and identification of digital competence gaps). For the purposes of the study the items were modified and presented with examples of their manifestation. The items were contextualized in their work activities in order to be in line with the topic (e.g., *When he/she has to search for information to prepare for the meeting....)* and the requirements were assessed on a five degree scale: 1-there is no need for the competence, 2-basic level (*he/she is aware of the existence of it and is able to use it with assistance*), 3-intermediate level (*he/she knows how to use it without help for well-known simple tasks*), 4-advanced (*knows how to use it for complex problem and is able to assist others*) and 5-expert (specialized) level (*knows how to make adjustments and improvements, and provide solutions for complex problems*).

Relying on the paradigm of a generalized approach to digital competencies and with no intention to develop our own framework for managerial digital competencies, this instrument was chosen. Its facilitates interstudy comparisons and its flexibility enables it to be adjusted to concrete research goals. As already said, these competencies were assessed by HR experts for different levels of managers (operational, middle, and top-executive). Descriptive statistics were obtained, Cronbach`s α coefficient of internal reliability was calculated. The effect of digital development on competencies and the effect of differences between competency level requirements were obtained by ANOVA tests of within-subjects effects, between subject-effects and within subjects contrasts.

4.3. Respondents sample

As scholars often identify HR managers as the ones responsible for digital transformation, dealing with the employees' resistance and their skill development, we believed that their specific position could give them an advantage in the employees `assessment. They are expected to overcome the gap between technological advancement and digital readiness of employees and might have an objective view toward the current state of employees' skillfulness.

From the pool of 453 human resource managers in our database, slightly more than 21% responded to our questionnaire. The respondents' sample consisted of 97 HR experts working in middle-sized and large companies in different non-IT sectors. 51.5% of respondents were employed in large and 48.5% in small and medium enterprises. The majority of the sample comes from the marketing and trade industry (30.9%), as well as from economics, accounting, and finance (21.6%), production and engineering (20.6%), media and tourism (16.5%) and humanistic and social sciences (education, medicine) (10.3%). According to state official statistical data this sample does not represent the situation at the current labor market (concerning the companies' sizes and industry and might be qualified as convenient sample.

The gender structure of sample consists of the 27.8% male and 72.2% female respondents with the average number of years working in human resource management and related occupations being M=8.45 years (SD=5.978), with a minimum of 1 and maximum of 25 years.

5. Results

Concerning the instruments, the internal reliability of the scale used on our sample for assessing the level of organizational digital development is α(7)=.82. The modified version of DigComp scale shows different levels of internal reliability for different subscales and positions. According to results, there is a tendency for reliability to decline depending on the level of the managerial position assessment. The highest reliability coefficients are achieved when the instrument is used on operational level, while the lowest are for executives (especially for digital literacy) implying these assessments are less reliable, and it is presented in Table 1.

Table 1. *Internal reliability of the scales*

Cronbach`s	Dig. literacy		Comm&coll		Cont.creation		Safety		Problem solv.	
	α	N	α	N	α	N	α	N	α	N
operation	.9	3	.94	6	.86	4	.94	4	.94	4
middle	.76	3	.87	6	.74	4	.9	4	.85	4
executive	.69	3	.84	6	.77	4	.9	4	.88	4

5.1. Level of company`s digitalization and digital competency requirements

In Figure 1, we can see that the usage of communication and collaboration tools is the most developed aspect of digitalization, which might be expected (especially after Covid) but it is obvious and positive that all the other indicators are almost evenly presented. From the HR point of view, it is slightly pessimistic that the least recognized is the assessment of digital competencies of candidates in the process of selection. The results are similar to the findings from the previous research with more companies included and conducted before the Covid (Kovačević, et al., 2019). The overall average digital development assessed for the organizations on the three-degree scale is M=2.51 (SD=.4), which is relatively high. The findings consider the pervasive usage of communication and collaboration tools (that were necessary in some periods), with the average assessment of M=2.81 (SD=.391). All other indicators of digital development in organizations are less present or perceived, with the awareness of the digital strategy existence and emphasizing digital skills in the process of the employees` selection being the lowest (M=2.22, SD=.696 and M=2.26, SD=.726).

Figure 1. *Descriptive statistics for different indicators*
of digital development in organizations
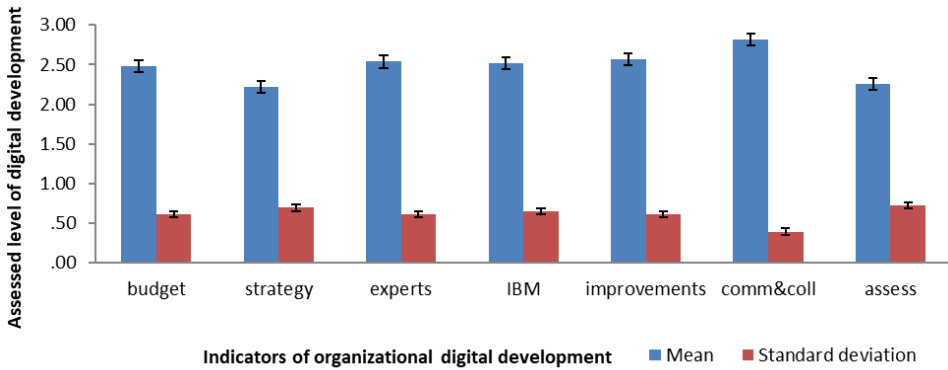
Note. 1 – not present at all; 2– present in some amount; 3– fully present

The results show that Information and data literacy has the highest average scores on the level of requirements, which is not unexpected due to its basic role in managing virtual tasks (M=3.88, SD=0.731). It is followed by the Safety (M=3.65, SD=1.017) and Communication and collaboration competencies (M=3.63, SD=0.824), with a slightly less relevant proficiency in Problem solving (M=3.52, SD=0.875) and with the lowest average level of requirement for Content creation (M=3.26, SD=0.835). Figure 2 shows that Information and data literacy has the highest scores, followed by safety issues, with Content creation having the least importance as a competence. The problem solving issue is only emphasized in the category of executives.

When the relation was established between digital development of a company, as it is assessed, and the importance of digital competencies, weak correlations were found. The strongest are between content creation and digitalization for middle level (r(93) =.38, p=.001). It is interesting because this managerial role is in the center, oriented toward communication and this competence is the least expected from managers according to our respondent sample. There is a question to think about their tasks in the new arrangements.

At the level of all included variables, regardless of the competency and the managerial level, digital development of the company positively predicts the importance of all digital competencies at all levels $F(1,82)=14.620$; $p<.0001$, $\eta=.151$. Nevertheless, the digital development level is not found to be the covariate of neither independent variable:

Competency x digital development: $F (4, 96) =.330$, $p=.858$,

Managerial level x digital development: $F (2, 96) =.500$, $p=.607$ and

Competency x level x digital development $F (8, 96) =.526$, $p=.837$

5.2. Organizational position
and digital competency requirements

As we established that digitally perceived organizational context matters, the main question in the paper considers potential differences in digital competences requirements for different managerial levels. In Table 2 descriptive statistics for the digital competency requirement level are given, representing the differences in assessed averages for the five competency domains for three different managerial positions.

Table 2. *Descriptive statistics for required level of digital competencies for operational, middle, and executive management positions.*

Managerial position	Competency area	Data literacy	Communication & collaboration	Content creation	Safety	Problem solving
operational	Mean	2.95	2.84	2.49	3.02	2.59
	Standard deviation	1.340	1.317	1.219	1.441	1.339
	N	97	97	97	97	97
middle	Mean	4.10	3.81	3.34	3.81	3.69
	Standard deviation	.836	.903	.891	.997	.980
	N	97	97	97	97	97
executive	Mean	4.61	4.28	3.93	4.13	4.25
	Standard deviation	.600	.794	.884	.967	.856
	N	97	97	97	97	97

Note: 1 – not required; 2– basic level; 3-intermediate level; 4-advanced level; 5-expert level

While Information and data literacy is found to be important at an almost expert level for executives and an advanced level for middle managers, it seems that an intermediate level is acceptable for the operational level. Safety is seen as the important domain for managers, but again, at an advanced and intermediate level for executive and middle managers and at an intermediate level for operational positions. Communication and collaboration, expected to be an important virtual skill in the post-covid era and especially for managers, it is in the third place, according to human resource managers, with slightly more than basic expectations for the operational level, almost advanced for middle managers, and advanced for executives. It is similar with the Problem-solving competency that implies choosing and adjusting digital tools managers at an executive position need it in an advance form, the middle management needs it at an intermediate level,and the operational level of management requires it at a, slightly more than basic level. The least demanding digital competency, Content creation, referring to the skills of preparing and presenting prepared material is seen as needed in a less than advanced mode even for executives and middle managers and at the basic level for operational managers.

A further analysis of these differences shows that there is no interactional effect of competency x level type (F (8, 96) =.951, p=.474), concluding that,

when there is a level of assessment in question, this does not affect the level of the competency type assessment. Also, there is no main effect of a competency type (F (4, 96) =1.882, p=.124), which means that there are no differences in appointed importance regardless of the level of assessment.

Contrasts imply that the main effect of the managerial level (F (2, 96) =5.258, p<.05), is that regardless of the concrete competence, the levels vary between themselves. It stands for each competence and from Figure 2 it is transparent that the requirements increase in line with the assumed managerial level. When comparing digital competency requirement levels between three different managerial positions, we can see that the Information and data literacy requirement, although required at a relatively high level, is perceived as less needed for operational positions compared with the requirement for middle and executive managers. The ascending trend of the highly required Information and data literacy level is almost parallel with the trend found for the digital competency domain that has the lowest scores for the level of requirements Content creation. All other digital competency areas follow a similar trend.

Figure 2. *Digital competency requirement level for operational, middle, and executive managers*
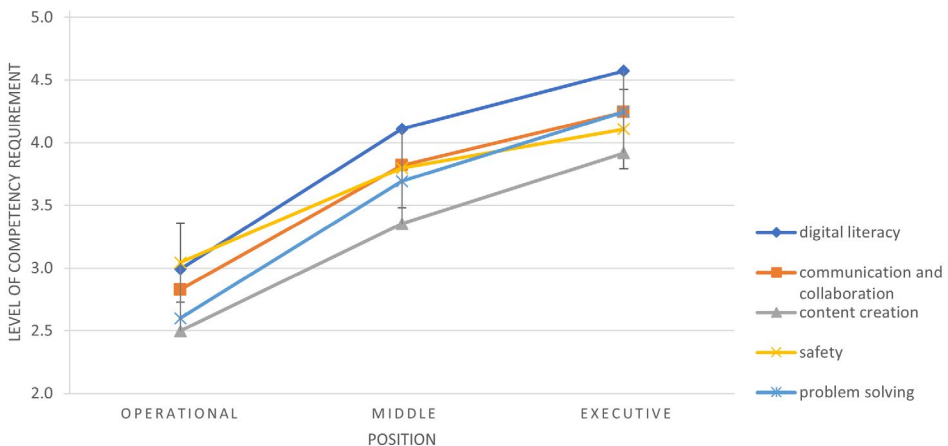
Finally, the results corroborate the hypothesis of the overall effect of the organizational digital development on the perceived level of required competencies in general, without a differential effect for managerial positions, as well as for the digital competency domain. Nevertheless, there are differences between positions at the general level of required digital competencies (for every competency area).

6. Discussion and conclusion

Research was conducted with the aim of providing insight into the expected digital competencies of managers at different hierarchical positions in the

context of digital development of an organization. We identified HR experts as the relevant evaluators of these competencies as it is in the scope of their job tasks. The modified DigComp scale in our sample follows the tendency toward a more internal reliability when it is applied to lower levels of managerial positions. It might be explained by the fact that HR experts could have more insight into the concrete work of operational and middle managers and the specific tasks of executives are less available to them. The assessed digitalization level is taken into consideration to provide a benchmark for organizations to differ, deliberately neglecting the industry. The industries vary in their digital readiness but there is a lot of diversity inside the same category and the sample is rather limited, not providing the opportunity to make comparisons between industries.

Our first hypothesis was confirmed, showing that there is not only the correlation between a perceived level of organizational digital development and required digital competencies but that the organizational context positively predicts the heightening of the level of demanded digital competencies. Having in mind that researchers almost agree that there is a relation between the level of organizational digital development and digital skillfulness of employees (Oberlander, Beinicke & Bipp, 2020), it is not surprising and thus not very informative, especially considering that the same person rated both variables, but it gives us the context for other comparisons. Contrary to the findings of some researchers (Mazurchenko & Svermova, 2021; Cetindamar Kozanoglu & Abedin, 2021; Sousa & Rocha, 2021), we found the reverse effect, implying that the level of digitalization in an organization can be seen as the context that drives toward higher levels of required employees` competencies. This phenomenon can be explained by the fact that technological development has an impact both on individuals and organizations at the same time (Park, 2019), and employees are not exposed to technology only at the workplace but also in their everyday life, sometimes developing their skills more rapidly than organizational changes occur (Delloite, 2017). In this research design, the primacy of evaluating the current organizational digitalization level followed by assessing the desired levels of competency, might influence the resulting order.

The effect of organizational digitalization is rather pervasive and has no differential effect, either on the managerial level, nor concerning the competency area, which is not in complete concordance with our second hypothesis, where we expected clear differences between managerial positions. Yet, there were discrete differences between management positions, with the importance of all digital competencies increasing with a higher ranking in a managerial position. So, the differences between level of required competencies exist and they vary in the same way regardless of the competence, but there is no pattern of their differences, and we cannot define, for example, the most relevant competency, or some competency profile for the position. It is in some concordance with the studies implying different task goals of different managerial positions (Gitleman, et al., 2022) and positions in the organizational network thus expecting different levels of digital competencies (Zentner, Spremic & Zentner, 2022).

Information and data literacy seems to be the competency with the highest required level for managers, while content creation requirements are the lowest. The first finding is in line with the studies emphasizing the most important contemporary managerial competency to manage huge amount of data (of course technologically supported), and to be skillful in the decision-making process driven by those data and supported by decision support systems (Shet & Pereira, 2021). The other mentioned result is not in line with some studies that appeal to the fact that technology enables sharing information at a speeding rate, while focusing on networking and transparency, overly exposing managers to social media and wide public arena. So, it is expected from them to also develop presentation skills adjusted to the new digital context (Natkarni & Prugl, 2021).

Comparing our results with other studies we see two different approaches, one analyzing the digital competencies isolated from other required skills and the other focusing on their integration. As it is expected from managers to be role models and in the spotlight, especially in times of organizational changes, Natkarni and Prugl (2021) believe that their transformative style should be emphasized, as well as their soft skills and communication competencies, which go beyond digital. Further, some authors (Reis de Macedo et al., 2023; Shet & Pereira, 2021; Gitleman, et al., 2021) insist on technologically driven interdisciplinarity. Nevertheless, all those soft and leadership skills are outplaced into a virtual environment or require digital tools to be performed, so the concepts of e-leadership and E-competency model are constructed (Roman, et al., 2019). As we focused only on digital competencies per se, there might be a lack of context.

The second hypothesis that specifies the expectations that middle managerial positions might require the highest level of digital competencies, must be rejected. Although authors postulate the reasonable idea that the middle management role might be the most affected position requiring the highest level of digital skills, especially communication and networking (Narkarni & Prugl 2021), we did not find data to confirm it.

6.1. Concluding remarks

The study of the effects of perceived organizational digital development on assessed levels of required digital competencies of employees at three different managerial positions, imply that digital competency requirements are increasing according to the work environment demands and position. Nevertheless, the differences between managerial positions are not conclusive.

The limitations of the study are in the relatively restricted sample of respondents to evaluate the digitalization process and the requirements of employees in that context. Although their specific organizational role is assumed to enable them to demonstrate excellence in the process of assessment (Nankervis, 2023), it is reasonable to speculate that HR experts might lack the information about the digitalization of all the organizational processes. Their projections are limited. For further research, it might be advisable to ask digital experts to evaluate the digital maturity of the organization, or to establish it on some more

objective parameters. Also, there is one more limitation regarding the sample. The number of respondents is almost equally represented from medium and small enterprises, and from large companies, which does not correspond with the situation on the labor market, where small and medium companies employ significantly more employees (Burzanović, 2023). It implies that our sample is biased toward large organizations and might indicate some systematic difference in digital development and workforce competencies.

Although we found it useful to see the growing trends of digital competency requirements along with more digital development and higher managerial positions, further research is needed. Especially if we have in mind studies like Liu and colleagues (Liu et al., 2022) who found that managerial technical skills have less relevance when it comes to the adoption of new technologies in leadership, compared with energy, responsibility, and analytical skills. Future research might focus on combining digital competencies with more traditional leadership and managerial traits. Also, as we did not find the expected pattern of competencies for different managerial positions, we might approach it in further research according to the ideas of Frank and colleagues (Frank, et al., 2019). They summarize the characteristics expected from managers that make them compatible with digital changes, emphasizing the domains of operational management, people management and technological integration which might refer to three different managerial position goals. Also, it would be interesting to take a glance into the content of required digital competencies and create a profile of competencies for each management category-level, as some research does regarding a specific domain or industry (Natkarni & Prugl, 2021).

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