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Intergenerational Differences and Knowledge Transfer Among Slovenian Engineers

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Background and Purpose: The study investigated the impact of intergenerational differences on knowledge transfer among engineers in large Slovenian production organizations.
Method: Using the Delphi method, experts answered open-ended questions. The process concluded with a consensus reached in the third round. The resulting questionnaire was then administered to engineers of all ages working in large production organizations.
Results: The experts' responses indicated that intergenerational differences are most prominent in the workplace in terms of computer literacy and the use of information and communications technology. Effective employee engagement, including exemplary leadership, a system of mentoring and reverse mentoring, and a supportive organizational culture, was found to enhance the flow of knowledge transfer. Statistical analysis revealed that there are statistically significance intergenerational differences in knowledge transfer among engineers in large production organizations ($p < 0.001$).
Conclusion: The study's findings suggest that recognizing intergenerational differences and fostering the abilities of employees can contribute to organizational success. However, the study is limited to engineers in large production organizations in Slovenia. Future research should explore organizations in a wider geographical area and across different sectors.

Keywords: *Knowledge, Knowledge transfer, Generations, Intergenerational differences, Organization, Engineers, Manufacturing/production organizations*

1 Introduction

An aging population is one of the key challenges facing our society and is considered one of the macro challenges of today's society (Goldin & Kutama, 2017). According to the European Commission (2022: 10), healthy lifestyles and advances in medicine have led to more people living longer and in better health. As a result, the number of retirements is expected to increase, but older workers may choose to stay in the workforce longer. Meanwhile, younger generations are entering the workplace with distinct characteristics compared to other generations. Generational differences exist among individuals of the same age group as they are shaped by their unique historical and lifestyle experiences. Today, there are four or five generations working in the workplace. Brečková (2021: 103-125) argues that knowledge of these differences helps to promote intergenerational dialogue and intergenerational learning in the workplace. Slovenia has untapped potential as half of its workforce is between 55 and 64 years old, compared

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to 60% in other European member states (European Commission, 2022: 6). Keeping pace with the development of digitalization requires both employers and employees to adapt to changing work processes, while managing communication and teamwork becomes more challenging. In any industry, competitiveness is dependent on factors such as learning, creativity, and knowledge. Juričevič Brčićeva and Mihelič emphasize the value of retaining and sharing knowledge within an organization (2015: 853–867).

Due to the presence of multiple generations in the workplace, significant intergenerational differences can impact knowledge transfer (Davis et al., 2012: 1-14). In a larger study of engineers in manufacturing companies in Slovenia, we investigated the effect of factors such as intergenerational differences, reciprocal relationships, rewards, trust, and commitment on knowledge transfer. Engineering knowledge, as defined by Davenport and Prusak (1998: 1-5) is information with intrinsic value that includes connections to people, places, things, and technology. Our literature defined knowledge, knowledge transfer, and the factors that influence it. Effective knowledge transfer helps improve work processes and enables organizations to quickly adapt to change and competition. In this paper, we present the findings of our research on intergenerational differences and knowledge transfer among engineers in large production organizations. To the best of our knowledge, no previous research has explored this topic of engineers within large production organizations. The results of our research will assist owners, managers, and other key stakeholders to run their organizations in an agile manner.

2 Literature Review

2.1 Knowledge

The literature provides various definitions of knowledge and its types. Polanyi (1983: 20-23) theorized that human knowledge includes both theoretical and practical knowledge, referred to as 'knowing what' and 'knowing how,', and that there exists a tacit dimension to knowledge that cannot be fully expressed in words. According to Yang (2019: 217-224) this tacit or implicit knowledge creates more value for the organization because it is difficult to replicate, encode, and put into words, and serves as a foundation and source for shaping organizational competitiveness.

Wong et al. (2004: 173) defined knowledge transfer as "a process of systematically organized exchange of information and skills between entities". Cai et al. (2019: 421- 438) posit that investing in organization's intellectual capital, its people, leads to improved competencies and a quicker response to technical, technological, and ecosystem changes). Gorenc Zoran (2022: 59-62) pointed out the value of integrating psychological capital into organizations as it contributes to increased levels of satisfaction and a positive working environment. Pereira et al. (2019: 1708-1728) argue that organizational flexibility manifests as intellectual agility, which involves the acquisition, transfer, and integration of knowledge from various perspectives. In the 20th century, knowledge sharing became necessary for organizations to increase their efficiency, effectiveness, and responsiveness (Prusak, 2001: 1002-1007; Serenko & Bontis, 2013: 137-155; Wiig, 1997: 6-14;). Rapid technological developments have increased the need for continuous professional development and upskilling. Soeiro et al. (2017: 66-77) noted that it is important to document and evaluate the learning outcomes of formal, non-formal, and informal training and the competencies of engineers in the organization. Davenport and Prusak (1998: 1-15) define engineering knowledge as information with intrinsic value that is constantly growing and built upon past acquired knowledge and knowledge transfer among members of different generations. Dalkir (2017: 50-52) emphasized that knowledge management enabling factors must be designed to promote collective knowledge sharing, individual knowledge development, and the maintenance of knowledge-based content within the organization.

2.2 Definition of Generations and Intergenerational Knowledge Transfer

Individuals belong to a certain generation and are defined as a group of people born within a span of roughly thirty years, who share similar experiences or attitudes (Collins English Dictionary, 2022). Although the names and definitions of generations may vary, common definitions include Veterans (born between 1928 and 1945), Baby Boomers (born between 1946 and 1964), Generation X (born between 1965 and 1980), Generation Y (born between 1981 and 1996), and Generation Z (born between 1997 and 2012) (Dimock, 2019: 1-7; Fryrm, 2018: 1). Generation Alpha, yet to be fully defined is expected to emerge in 2025. The exact temporal boundaries of a new COVID-19 generation are currently being tracked since 2020, but remain unclear. It should be noted that individuals born within three years of the beginning or end of a generation may exhibit characteristics of either the preceding or subsequent generation, based on factors such as upbringing, wealth, age of parents, education, and others. (CGK, 2020, n.d.). Identifying individuals by their age group can aid in understanding common characteristics, attitudes, and personalities that emerge in different circumstances (Rudolph & Zacher, 2020: 139-145).

In the knowledge management literature, the terms knowledge sharing, knowledge exchange, and knowledge transfer are frequently used. However, for the purposes of

this article, the term knowledge transfer will be used as it is considered a more comprehensive term that includes knowledge sharing (Tangaraja et al., 2016). The terms knowledge exchange and knowledge transfer are only used when the cited authors use them explicitly.

The rapid pace of economic, automation, and technological changes in the 21st-century is transforming work processes and creating new forms of knowledge. This has made the transfer of knowledge between employees in an organization increasingly important (Balle et al., 2020: 1943-1964). Nguyen et al. (2019: 998–1016) have emphasized the significance of knowledge sharing for achieving organizational competitiveness and boosting employee engagement in the workplace. The aging of the workforce and the increasing diversity of ages in organizations raise the question of how knowledge can be effectively retained and how employees engage in knowledge transfer throughout their careers. According to Dietz et al. (2022: 259-276), younger employees are able and motivated to receive knowledge, while older employees are able and motivated to share knowledge, hence, work processes must be organized and incentivized to facilitate these activities. It is crucial to eliminate employers' biases against younger and older workers and to promote the value of intergenerational cooperation in the workplace, creating appropriate working conditions in the process (Rožman, & Tominc, 2014: 3-11). Knowledge hiding and accumulation can occur unintentionally due to individuals' ignorance of the knowledge needs of others. However, individuals may choose to accumulate and hide knowledge due to factors such as job dissatisfaction, low motivation, negative relationships, and job insecurity (Anand et al., 2020: 379-399).

2.3 Hypothesis Formation

According to Joshi et al. (2011: 177-205), individuals who were born in a similar historical period and cultural context and share similar experiences in their upbringing tend to exhibit common values, behaviors, and attitudes. In today's rapidly changing organizational environment, it is crucial to have an understanding of the diversity of employees in the workplace. This can help to mitigate conflicts, improve communication, and reduce tensions and misunderstandings that can negatively impact factors such as absenteeism, work engagement, organizational behavior, and productivity (Zopiatis et al., 2012: 101-121). Generational diversity, particularly among Veterans, Baby Boomers, Generation X, and Generation Y, plays a significant role in this aspects, with the younger Generation Z entering the workforce (Sakdiyakorn & Wattanacharoensli, 2017: 135-159).

The process of knowledge transfer takes place between individuals who are willing to share and those who are willing to receive knowledge (Fasbender et al., 2021: 2420–2443). Research by Schmidt and Muehlfeld (2017: 375-411) has shown that intergenerational knowledge transfer is hindered in organizations with a mix of ages due to a likely increase in conflict. According to Davis et al. (2012: 1-14), generational differences are perceived as barriers to knowledge transfer in engineering. Kim (2008: 81) noted that generational characteristics have an impact on knowledge transfer. As a result, when working with a diverse range of generations in an organization, it is necessary to consider their similarities and differences, and expectations. Evans (2013: 1-17) emphasized the role of a shared vision and trust in knowledge sharing and its positive effect on the willingness to share, receive, and perceive knowledge.

Based on the findings, we developed the following hypothesis H1: Intergenerational differences have a statistically significant effect on knowledge transfer.

3 Methods

This section outlines the entire research process and a visual format was developed (Figure 1) for clarity.

Our study was initiated with a comprehensive review of both domestic and international literature to create a conceptual framework. We organized our literature using the free tool Mendeley, which allowed us to organize our references and citations and capture relevant information such as summaries, codes, categorizations, and bookmarked data. The first stage of the study employed the Delphi method, chosen for its ability to gather and coordinate the opinions of experts who are familiar with production organizations. The respondents received questions several times in a row, building upon their responses from previous rounds. The Delphi method was deemed appropriate for our study due to its utility in drawing upon the subjective judgment and collective intelligence of experts to address problems, as well as leveraging their experience and knowledge to describe the problem (Linstone & Turoff, 2002: 3-12). The participants in our study were experts from large production organizations in Slovenia including general managers, HR managers, and quality managers. The availability of the experts was the key factor in determining the sample size, with the understanding that the results obtained are not generalizable. The aim of this qualitative study was to gather the opinions, suggestions, and perspectives of these experts on the research topic.

A mixed-methods study was conducted in large production organizations in Slovenia, with participation from at least one organization from each region. The data on large organizations was obtained from the Agency of the Republic of Slovenia for Public Legal Records and Related Services (AJPES), in compliance with the criteria for company size classification set forth in the Companies Act (ZGD-1). The sample was limited to production organi-

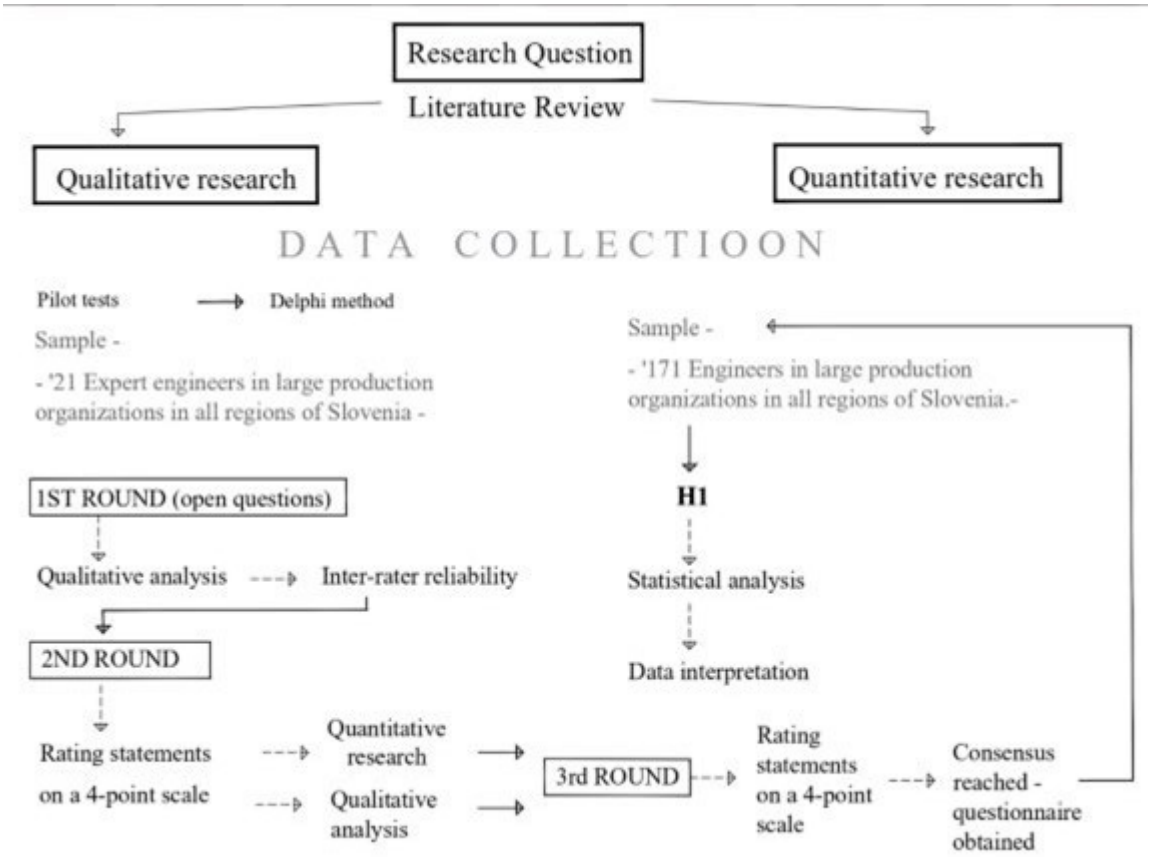

Figure 1: Research Design

zations, as determined by the professional guidelines and the standard classification of activities (SKD) available at AJPES.

It should be noted that we had a planned time frame for the survey, from November 2021 to the end of March 2022, but changed due to COVID-19 as it was challenging to encourage experts to participate. During that time, organizations complained about absenteeism and related substitutions, which caused staff to be overworked and pressed for time. However, we managed to recruit experts from all 12 Slovenian regions. In total there were three rounds.

At the beginning of the study, a welcome letter was emailed to all 161 organizations inviting them to participate and explaining the purpose and process of the research. The questionnaire was then sent to 21 participants who agreed to participate and formed the designated Delphi expert group. The first round of the Delphi method consisted of open-ended questions and was completed after receiving responses from all 21 experts. The second and third rounds were designed for consensus building and involved grouping categories and statements into sets for scoring using a four-point numerical Likert-ranking scale. The responses from the second round were processed using the program Atlas.ti.22 and were evaluated by three research experts. The updated questionnaire for the third round was prepared based on the results of the second round, and the experts re-rated and ordered the topics in the third round. In each round, participants had the opportunity to discuss the topic more broadly, change or confirm their opinions, and compare their answers with the opinions of other experts.

The responses obtained from the Delphi expert group served as a basis for the design of the questionnaire for the subsequent quantitative study. The questionnaire was distributed to all 358 engineers working in the 21 participating large production organizations. The responses (n = 171) were analyzed using MS Excel and IBM SPSS 22.0 statistical software and are presented in tables and figures.

The aim of this research was to examine intergenerational knowledge transfer among engineers in large production organizations from multiple perspectives. To achieve this, we employed a mixed research methodology that combined qualitative and quantitative methods. The

qualitative component, using the Delphi method, provided expert opinions on open-ended questions according to a planned protocol. The quantitative methods, based on the statements developed by the experts, offered a comprehensive understanding of the topic.

Prior to administering the questionnaire for the quantitative study, we conducted a pilot test to assess the clarity and comprehensibility of the questions. The qualitative data obtained from the Delphi method was analyzed using the program, Atlas.ti 22. According to Silverman (2005: 223), the criterion of reliability is also defined by the consistency of data analysis, which means that computerized analysis is more accurate than manual analysis. The analysis process also was reviewed by three experts (i.e., member-check) to ensure reliability and credibility (Creswell, 1994). Inter-rater reliability was calculated at 97% (Miles & Huberman, 1994), and any discrepancies were resolved through discussion among the coders. The questionnaire for the quantitative study was developed based on the Delphi method. The internal consistency of the questionnaire was checked using the calculation of covariances or correlations between variables expressed as Cronbach's alpha coefficient. The reliability level ranges from 0.738 to 0.980, indicating good to excellent reliability.

4 Results

4.1 Results of the Delphi Method

In Slovenia, during 2021, production organizations generated a net profit of €1,974,460,000, which accounted for 34.62% of all activities and all company sizes (AJPES, June 2022). Among the large manufacturing production organizations that participated in the survey, a net profit of €505,717,763 was generated, corresponding to 25.62% of all large companies in the sector (AJPES, 2022). In the first part of the survey, 21 experts participated, with at least one expert responding from each region of Slovenia, and in some cases more than one, with the highest response rate in the southeastern region (n = 7). Of the participants, 66.7% identified as male and 33.3% as female. More than 90% of respondents were experts who had achieved at least a bachelor's or master's degree, according to the Slovenian Qualifications Framework (SQF, n.d.) scale.

The following is a condensed version of the analyzed responses of the experts on the topic of intergenerational differences among employees in the organization. One respondent reported that there were no differences between generations in their company; however, they noted differences in computer skills and language proficiency, work quantity and quality, communication style, organizational commitment, and interpersonal relationships. One expert added: *"Differences between generations are a natural phenomenon, but they are exacerbated by the boom in digitalization, which is widening the gap between older generations, to whom digitalization is rather alien, and younger generations, who take it for granted. There are also contradictory differences between the generations in the way they acquire knowledge and the knowledge they actually acquire in educational institutions."* The digital divide between older and younger generations is widening, with the latter group having greater access to technology and more technologically literate. Experts noted differences in the way each generation acquires knowledge, with older generations relying on their experience and younger generations relying on available resources. Respondents also noted differences of greater individualism and empowerment of rights of younger generations. Respondents perceived differences in values and work practices, while younger generations being more individualistic and valuing freedom and flexibility, whereas older generations are more concerned with job security and adapting to change. *'/.../ Baby boomers are very concerned about job security and find it harder to adapt to change, especially technological change, because they are concerned about their jobs. Whereas Generation Y employees value freedom and flexibility and are not interested in a job or project that might take up so much of their time that their freedom and flexibility are compromised /..../"* Older, more experienced colleagues need more time and encouragement to recognize the added value that younger colleagues bring, such as fresh ideas and greater computer literacy. On the other hand, younger generations are more responsive to mastering new technologies and software. The organization should also acknowledge the wealth of knowledge that older colleagues bring in terms of hands-on experience and knowledge of policies, procedures, and planning rules.

From the experts' responses, it appears that the older generations bring distinct skills and view knowledge transfer with the younger generation as a positive experience. However, they also caution that conflicts may arise when each generation is confident in their right. One expert notes that intergenerational diversity effects knowledge transfer *"excellently and leads to accelerated personal development and excellent individual and team performance, all given the right placement in the workplace, in a work environment with a good team and the right leader and management."* Another expert states that *"the older generations learn from the younger generations, and we can speak of a mutual transfer of knowledge. The older generations have in-depth expertise based on years of experience in building or managing relationships. Younger generations are very advanced in their knowledge and experience in terms of innovation or IT technologies. Older generations embody stability and consistency and are more focused on leveraging resources, while younger generations are more focused on constant and rapid change and sustainable resource management. Diversity between generations in the workplace has a positive impact on knowledge transfer, as*

each generation can do something well and successfully, and knowledge complements each other." Most wrote that there is a two-way transfer of knowledge across age groups in the workplace, regardless of intergenerational diversity.

In the Delphi method, a decline in the number of experts participating was observed in the second and third rounds, with 20 and 19 participants respectively. The results presented in Table 1 were derived from the first round and the consensus reached in the second and third rounds. The results indicate a high level of agreement among the

Table 1: Intergenerational Differences in the Workplace

	2nd round		3rd round	
Statements developed from the first round	M	SD	M	SD
Computer literacy and the use of new technologies	2.90	.718	3.79	.419
Work methods, work process, learnability, goal orientation	3.50	.607	3.26	.562
Acceptance of and attitude towards change and innovation, and adaptability in various aspects	3.25	.639	3.63	.496
Work experience and decision making	3.50	.607	3.47	.513
Work values and solidarity, openness to knowledge transfer	3.20	.768	3.21	.535
Communication style	3.40	.681	3.63	.496
Priorities, work-life balance.	3.35	.587	3.37	.597
Individuals' ambitions to be promoted (additionally based on respondents' open-ended answers)			3.37	.496
Statements with lower average agreement: interpersonal relationships; loyalty; individualism; leadership; work-life balance; solidarity; motivation.				

Table 2: Occurrence of Intergenerational Diversity in the Workplace

	2nd round		3rd round	
Statements developed from the first round	M	SD	M	SD
Younger and older employees work well together as a team, with older employees using their experience and foresight to temper the fast pace of problem solving	3.05	.605	3.00	.471
Experienced employees are more comfortable with emerging problems that are solved in the usual way, while younger employees take a different approach to problem solving and can find a long-term solution	3.50	.513	3.53	.697
The different generations complement each other's work, with older generations acting as mentors with their experience and specific skills, and younger generations teaching older generations the gaps in computer and language skills	3.60	.503	3.68	.478
The gap in knowledge transfer across generations occurs when the older generation is reserved and cautious because they fear for their position, while the younger generation is willing to share and accept knowledge, but sometimes their mindset is such that the knowledge of the older generation is no longer useful	2.95	.826	3.11	.567
Appropriate job placement with a good team and proper management will help ensure that both younger and older people are willing to learn from each other, which means knowledge transfer on both sides	3.45	.510	3.53	.513
Older people have in-depth expertise with many years of experience, embody stability, continuity and are resource-oriented	3.15	.745	3.26	.653
Younger people have a high level of knowledge and experience with new technologies and computer skills, are focused on sustainable resource management, and are ready for rapid and continuous change	3.20	.616	3.32	.582
Each generation is good and successful and something, and diversity can bring accelerated personal development and outstanding individual and team performance with exemplary leadership and established organizational culture.	3.65	.489	3.84	.375
Leading by example. (Additionally based on ' open-ended responses from Round 2 respondents)			3.58	.607

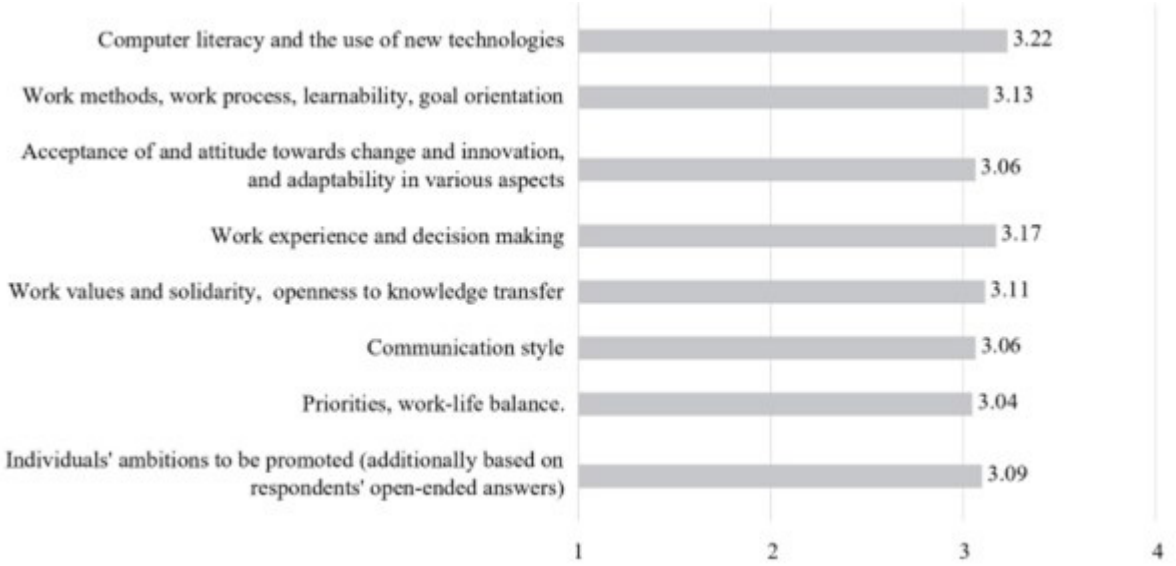

Figure 2: Generational differences

experts, with the lowest value being 2.9 (SD = 0.718) and the highest being 3.5 (SD = 0.607) in the second round. The third round had a range from 3.21 (SD = 0.535) to 3.79 (SD = 0.419). The statement that received the highest consensus score was "Computer literacy and use of new technologies".

In the examination of statements regarding intergenerational diversity, the statement "Every generation is good at something, diversity can bring about accelerated personal development and outstanding individual and team performance if there is exemplary leadership and an established organizational culture in the organization," demonstrated the highest level of agreement in both rounds. Agreement was high for all statements, as shown in Table 2.

Following a consensus reached in the third-round statements, we prepared the final questionnaire that we distributed to engineers in large production organization for the quantitative part of the study. Following are the results.

4.2 Quantitative Research Results

The study sample consisted of 171 engineers, with 82% identifying as male and 18% as female. The highest response rate was from Generation Y, at 45.61%, followed by Generation X with 37.43%. The response rate for Baby Boomers was 11.11%, and the lowest response rate was from Generation Z, at 5.85%. The participants were drawn from all twelve regions in Slovenia.

Engineers evaluated the statements on a 4-point scale, and the results showed (see Figure 2) that the highest mean score of 3.22 (SD = 0.7) was given to the statement "Computer literacy and use of new technologies." The mean scores of the other statements comparatively ranged from 3.04 to 3.22, with little difference between them. The statement with the lowest score was: "Priorities, work-life balance".

Intergenerational diversity is a factor we hypothesized that impacts knowledge transfer. The results, as shown in Figure 3, demonstrate that the mean scores for the statements ranged from 2.8 to 3.34. The statement with the highest score of 3.34 (SD = 0.60) was given to the statement that each generation is good at something and is successful, and that diversity can lead to accelerated personal development and outstanding individual and team performance, with exemplary leadership and an established organizational culture.

The results of the linear regression analysis, presented in Tables 3 and 4, suggest a linear relationship between intergenerational differences and knowledge transfer. The results indicated that a unit increase in intergenerational differences leads to an increase in knowledge transfer by 0.286. The correlation is statistically significant as shown by the p-value ($p < 0.001$), which is below the significance level of 0.05. The adjusted coefficient of determination (R2) suggests that the model explains 9.5% of the variance in knowledge transfer through intergenerational differences. The quality of the regression model is determined by the F-test and the p - value ($p < 0.001$) suggests that the model is of good quality. Furthermore, the results of the Durbin-Watson test (DW = 2.142) indicate the absence of autocorrelation errors in the regression model as the test results falls within the acceptable interval between 1.5 and 2.5.

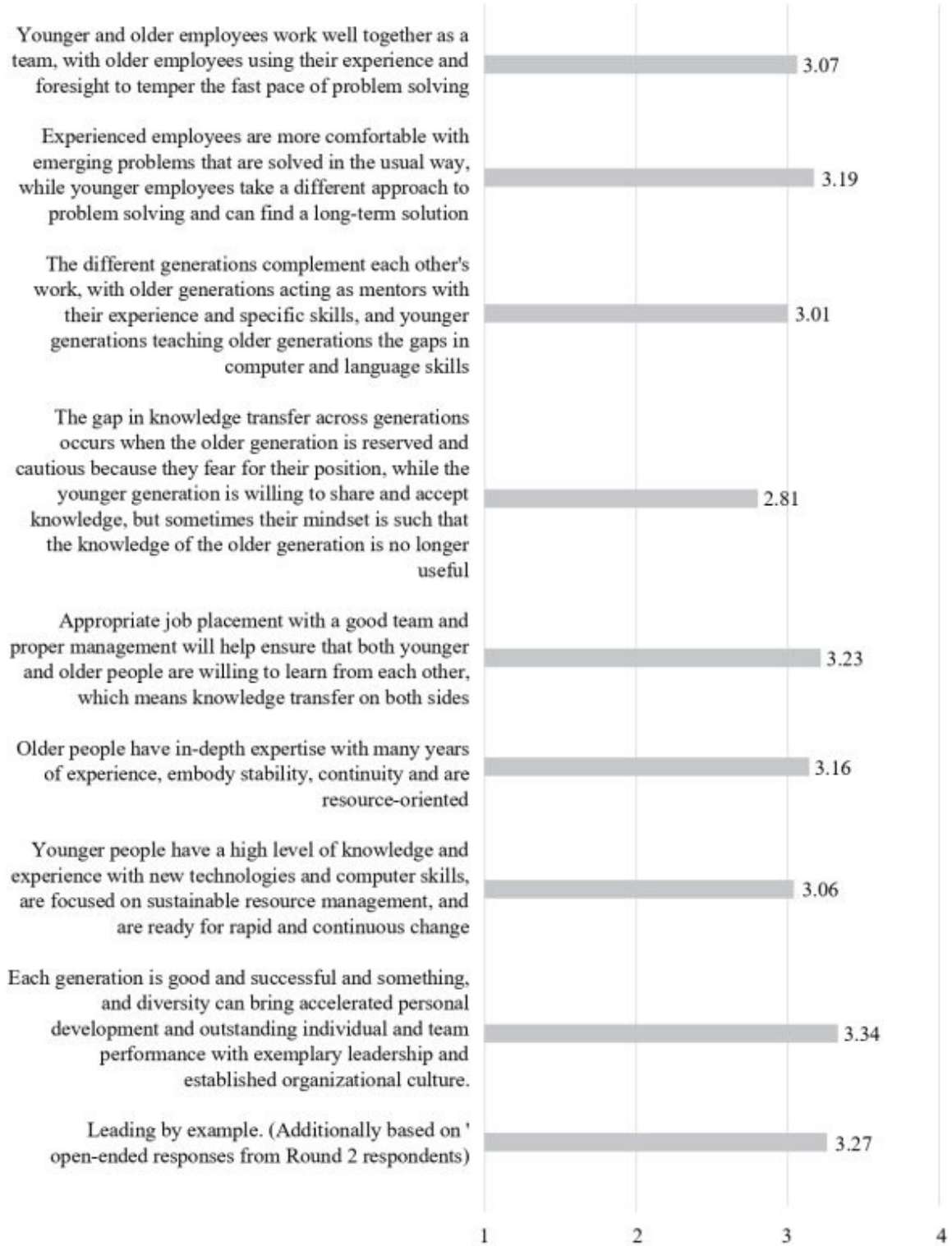

Figure 3: Occurrence of intergenerational diversity

Table 3: Summary of Regression Model 1 for the Variable: Intergenerational Differences

Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the estimate	Change Statistics					Durbin-Watson
					R Square change	*F* change	df1	df2	*p*-value	
1	.319a	.101	.095	.35246	.101	15.250	1	135	<0,001	2.142
a. Predictors: (Constant): Intergenerational differences										
b. Dependent variable: Knowledge Transfer										

Table 4: Knowledge Transfer Prediction Coefficients Using Intergenerational Differences

Model		Unstandardized Coefficients		Standardized Coefficients	t	p-value
		B	Std. Error	Beta		
1	(Constant)	2.437	0.229		10.621	<0.001
	Intergenerational differences	0.286	0.073	0.319	3.905	<0.001
a. Dependent Variable: Knowledge Transfer						

5 Discussion

In this study, we focused on intergenerational differences in the workplace and intergenerational diversity affecting knowledge transfer. We examined four generations (Baby Boomers, Generation X, Generation Y, Generation Z). The reader is reminded that we did not explicitly mention generations in the first part, but relied on the experts' answers.

In the first part of the study, we used the Delphi method to conduct interviews with experts on the factors affecting intergenerational knowledge transfer. The experts shared their views and comments, and a consensus was reaching on the statements analyzed. They perceived that older generations rely on their experience in their work and express it through their work processes, but may be resistant to innovation. On occasions, experienced colleagues may act superior to younger colleagues, requiring time and encouragement to appreciate the value they younger colleagues can bring. Our results showed that language and computer skills, in particular, may pose challenges for older colleagues, while younger colleagues are skilled in digital literacy and are more willing to embrace innovation. The younger generation is also advanced in the use of new information and communication technologies and is more focused on sustainable resource management. These differences between generations are reflected in values, work practices, solidarity, flexibility, and work-life balance. The experts also noted a gap in knowledge transfer between generations, with a stereotypical perception that older people think and act in an outdated way, while younger people lack knowledge and experience. This is in line with the findings of Constanca et al. (2020: 20-41) who attribute such differences to biases and stereotypes. However, the experts emphasized that each generation has strengths and that diversity can lead to improved work outcomes and personal development, given the presence of exemplary leadership and an established organizational culture, as demonstrated by Wang and Noe's (2010) study on the importance of organizational culture and trust. They also noted that knowledge transfer is not one-sided, and that older generations can learn from younger generations, through mechanisms such as traditional mentoring, reverse mentoring, and regular recording of all possible processes and knowledge.

This study is part of a broader research that explored the impact of four other factors (reciprocity, commitment, trust, reward) on knowledge transfer. The variable intergenerational differences in this study explained 9.5% of the total variance in knowledge transfer and was found to be of good quality, with no evidence of autocorrelation errors. Our analysis of data showed that intergenerational differences have a statistically significant impact on knowledge transfer, as evidenced by the results of the linear regression analysis ($p < 0.001$). The importance of knowledge transfer in promoting competitive advantage within a multigen-

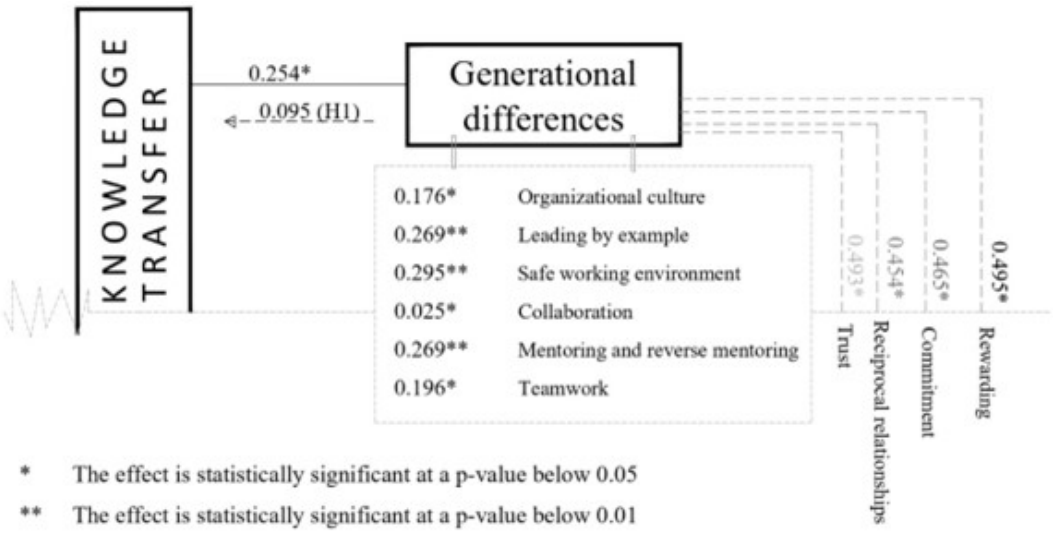

Figure 4: Intergenerational Differences and Knowledge Transfer

erational workforce has sparked interest in managing and mitigating the impact of intergenerational differences in knowledge transfer. However, we found no research on the effect of differences between four generations on knowledge transfer within large production organizations. Table 4 presents the strength of the effect of the independent variable on the dependent variable using the unstandardized coefficient. the results indicate that intergenerational differences have a positive effect on knowledge transfer. Additionally, we conducted structural modeling to determine if there were any additional latent relationships between the variables; the results are illustrated in Figure 4.

The results of the structural model show that intergenerational differences have a statistically significant effect on knowledge transfer (B = 0.244). Additionally, intergenerational differences successfully account for trust (B = 0.493), reciprocity (B = 0.454), commitment (B = 0.465), and rewards (B = 0.495). However, intergenerational differences are only a latent variable, serving as a proxy for measures of organizational culture (B = 0.176), exemplary leadership (B = 0.269), safe work environment (B = 0.295), mutual collaboration (B = 0.025), mentoring/ reverse mentoring (B = 0.269), and teamwork (B = 0.196).

6 Conclusion

The purpose of this study was to examine the factors that influence knowledge transfer in the workplace and determine the significance of intergenerational differences on knowledge transfer. The results showed that intergenerational differences were reflected in computer literacy and usage of new information and communication technologies. Despite these differences, the experts in the study believed that each generation has unique strengths that can lead to personal development and successful work outcomes. For intergenerational knowledge transfer to flow, the organization must create a supportive work environment, friendly working conditions, provide exemplary leadership, and foster a culture that prioritizes employees' values and goals. The quantitative part of the study surveyed engineers of various generations about intergenerational differences in the workplace and their impact on knowledge transfer. Our findings support the hypothesis that intergenerational differences have a statistically significant effect on knowledge transfer in large production organizations.

The results of our research have theoretical, empirical, and practical implications. However, it is important to note that the results are limited to engineers from Slovenian production organizations and cannot be generalized. The phenomenon of aging is becoming increasingly prevalent, as the population is living longer on average (Deller & Walwei, 2022: 25). This trend has led to an extension of workers' careers into old age, which raises issues related to economic development, retention of knowledge and skills within organizations, intergenerational differences in performance, collaboration, and knowledge transfer processes (Deller & Walwei, 2022: 25). Older workers cplay an important role in economic activities, facilitate knowledge transfer, and provide valuable skills (Deller & Walwei, 2022: 25). With the rapid changes in automation and technology, knowledge transfer is becoming increasingly crucial (Balle et al., 2020: 1943-1964). In the workplace, employees of different ages are often categorized as gener-

ations (Constanza et al., 2012: 1), which is generally seen as a group of people of similar ages who experience the same events at key developmental stages of life. Salvi et al. (2022: 98-100) disagree with this definition and conclude that generations are stereotypical social constructs and that attention should be paid to the effects of age and significant historical and cultural events, regardless of when they are experienced. However, when examining generational differences, the authors of this study believe it is more appropriate to focus on different conceptualizations of age and relevant factors that influence work-related outcomes, rather than solely on the concept of generations. We did this in the present study taking into account factors that impact the possibility of knowledge transfer between engineers in large production organizations in Slovenia.

The results in our study indicated that effective employee management includes a safe work environment with exemplary leadership, and a system of mentoring and reverse mentoring. We believe that management must keep pace with change and to modify policies and practices to meet the needs of each employee. Our research made an empirical contribution by finding a statistically significant difference in knowledge transfer among engineers in selected production organizations in Slovenia. This information can be of practical use to owners, managers, leaders, and other professionals in Slovenian organizations, including HR or HRM organizational units, in formulating knowledge transfer activities and strategies that are suitable for different generations of engineering employees.

In our research we encountered some limitations and assumptions. One limitation was the geographical scope of the study. Another limitation was the sample size, which consisted of only large production organizations based on the ZGD criteria, and had a lower response rate, possibly due to the epidemiological situation at the time of the survey. Despite this, the sample size was adequate to conduct the study. For future research, we suggest exploring the impact of intergenerational differences in micro, small, and medium-sized for-profit and not-for-profit organizations or other institutions in a wider geographical area. Additionally, the current study focused on engineers as the target population, and we propose to expand the study to other occupational groups, such as those in the social sciences or humanities, and to all employees in similar organizations.

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Literature

AJPES (2022, June). *Informacija o poslovanju gospodarskih družb v Republiki Sloveniji v letu 2021*. [Information on the operations of companies in the Republic of Slovenia in 202]. https://www.ajpes.si/doc/LP/Informacije/Informacija_LP_GD_zadruge_2021.pdf

Anand, A., Centobelli, P., & Cerchione, R. (2020). Why should I share knowledge with others? A review-based framework on events leading to knowledge hiding. *Journal of Organizational Change Management*, *33*(2), 379–399. http://doi.org/10.1108/JOCM-06-2019-0174

Balle, A. R., Oliveira, M., & Curado, C. M. M. (2020). Knowledge sharing and absorptive capacity: interdependency and complementarity. *Journal of Knowledge Management, 24*(8), 1943–1964. http://doi.org/10.1108/JKM-12-2019-0686

Brečko, D. (2021). Intergenerational cooperation and stereotypes in relation to age in the working environment. *Changing Societies & Personalities. 5*(1), 103–125. http://doi.org/10.15826/csp.2021.5.1.124

Cai, Z., Liu, H., Huang, Q., & Liang, L. (2019). Developing organizational agility in product innovation: the roles of IT capability, KM capability, and innovative climate. *R and D Management*, *49*(4), 421–438. http://doi.org/10.1111/radm.12305

Collins English Dictionary (2022). Generation. https://www.collinsdictionary.com/dictionary/english/generation

Constanza, D. P., Finkelstein, L. M., Imose, R. A., & Ravid, D. M. (2020). Inappropriate Inferences from Generational Research. In B. J. Hoffman, M. K. Shoss, & L. A. Wegman (ed.), *The Cambridge Handbook of the Changing Nature of Work*. Cambridge, UK: Cambridge University Press.

Creswell, J. W. (1994). *Research Design Qualitative and Quantitative Approaches*. California, USA: Sage. ISBN 9780803952553.

Dalkir, K. (2017). *Knowledge management in theory and practice*. MIT press.

Davenport, T. H. & Prusak, L. (1998). *Working knowledge: How organizations manage what they know.* Harvard Business Press.

Davis, S. M., Sarkani, S., & Mazzuchi, T. (2012). A systematic approach to identifying engineering generational knowledge transfer boundaries. *Journal of Information & Knowledge Management, 11*(03), 1250015. http://doi.org/10.1142/S0219649212500153

Deller, J. & Walwei, U. (2022). Workforce Age Trends and Projections. In H. Zacher & C. W. Rudolph (ur.), *Age and Work. Advances in Theory, Methods, and Practice*. (pp. 25–43) New York: First published 2022 by Routledge. http://doi.org/10.4324/9781003089674-3

Dietz, L. Burmeister, A. & Fasbender, U. (2022). Age and Knowledge Exchange: Ability, Motivation, and Opportunities. In H. Zacher, & C. W. Rudolph, (Eds.), *Age and Work: Advances in Theory, Methods, and Practice.* http://doi.org/10.4324/9781003089674

Dimock, M. (2019). Defining generations: Where Millennials end and Generation Z begins. *Pew Research Center*, *17*(1), 1–7. https://www.pewresearch.org/fact-tank/2019/01/17/where-millennials-end-and-generation-z-begins/

Evans, M. M. (2013). Is trust the most important human factor influencing knowledge sharing in organizations? *Journal of Information & Knowledge Management, 12*(04), 1350038. http://doi.org/10.1142/s021964921350038x

European Commission. (2022, 23 May). *Aging of the population remains a large challenge*. https://ec.europa.eu/info/sites/default/files/2022-european-semester-country-report-slovenia_sl.pdf

Fasbender, U., Gerpott, F. H., & Unger, D. (2021). Give and take? Knowledge exchange between older and younger employees as a function of generativity and development striving. *Journal of Knowledge Management, 25*(10), 2420 –2443. http://doi.org/10.1108/JKM-11-2020-0856

Frym R. (2018, 11 April). *Millennials are the largest generation in the U.S. labor force.* Fact Tank News in the numbers. https://www.pewresearch.org/fact-tank/2018/04/11/millennials-largest-generation-us-labor-force/

Goldin, I. & Kutarna, C. (2017). To flounder or flourish? In *Age of Discover: Navigating the Storms of Our Second Renaissance.* New York: Bloombury Business.

Gorenc Zoran, A. (2022). Work Wellbeing Manager: Interview with Dr. Annmarie Gorenc Zoran. *HR&M: strokovna revija za področje razvoja organizacij in vodenja pri delu, 39*(8), 59–62.

JOLP, Javna objava letnih poročil. *Revidirana letna poročila za leto 2021*. [Public announcement of annual reports. Revised Annual Reports for 2021]. https://www.ajpes.si/jolp/

Joshi, A., Dencker, J. C., & Franz, G. (2011). Generations in organizations. *Research in Organizational Behavior*, *31*, 177–205. http://doi.org/10.1016/j.riob.2011.10.002

Jurišević Brčić, Ž., & Mihelič, K. K. (2015). Knowledge sharing between different generations of employees: an example from Slovenia. *Economic Research - Ekonomska istraživanja, 28*(1), 853–867. http://doi.org/10.1080/1331677X.2015.1092308

Kim, D. J. (2008). *Generation gaps in engineering?* Massachusetts Institute of Technology. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=722703956ede14a786d23f1640144ea905dac0eb

Linstone, H. A., & Turoff, M. (Eds.). (1975). *The Delphi Method,* 3–12. Reading, MA: Addison-Wesley.

Miles, M. B. & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Newbury Park: Sage Publications.

Nguyen, T.-M., Nham, T. P., Froese, F. J., & Malik, A. (2019. Motivation and knowledge sharing: A meta-analysis of main and moderating effects. *Journal of Knowledge Management, 23*(5), 998–1016. http://doi.org/10.1108/JKM-01-2019-0029

Pereira, V., Mellahi, K., Temouri, Y., Patnaik, S., & Roohanifar, M. (2019). Investigating dynamic capabilities, agility and knowledge management within EMNEs-longitudinal evidence from Europe. *Journal of Knowledge Management*, *23*(9), 1708–1728. http://doi.org/10.1108/JKM-06-2018-0391

Polanyi, M. (1983). *The Tacit Dimension*. 3-25. Gloucester, MA: Peter Smith.

Prusak, L. (2001). Where did knowledge management come from?. *IBM Systems Journal*, *40*(4), 1002-1007. http://doi.org/10.1147/sj.404.01002

Rožman, M., & Tominc, P. (2014). Upravljanje starostne raznolikosti na delovnoih mestih. [Managing age diversity in the workplace]. *Our Economy (Nase Gospodarstvo)*, *60*(5-6), 3–11.

Rudolph, C. W., & Zacher, H. (2020a). "The COVID-19 Generation": A cautionary note. *Work, Aging and Retirement, 6*(3), 139–145. http://doi.org/10.1093/workar/waaa0

Sakdiyakorn, M. & Wattanacharoensil, W. (2017). *Generational Diversity in the Workplace: A Systematic Review in the Hospitality Context. Cornell Hospitality Quarterly, 59*(2), 135–159. http://doi.org/10.1177/1938965517730312

Salvi, S. E., Ravid, D. M., & Costanza, D. P. (2022). Generational Differences and Generational Identity at Work. In H. Zacher & C. W. Rudolph (ed.), *Age and Work. Advances in Theory, Methods, and Practice*. (str. 98–113) New York: Routledge. http://doi.org/10.4324/9781003089674-8

Schmidt, X., & Muehlfeld, K. (2017). What's so special about intergenerational knowledge transfer? Identifying challenges of intergenerational knowledge transfer. *Management Revue, 28*(4). 375–411. http://doi.org/10.5771/0935-9915-2017-4-375

Serenko, A. & Bontis, N. (2013). The intellectual core and impact of the knowledge management academic discipline. *Journal of Knowledge Management, 17*(1), 137–155. http://doi.org/10.1108/13673271311300840

Silverman, D. (2013). *Doing qualitative research: A practical handbook*. Sage.

Slovenian Dictionary of Literary Language (n.d.). Expert. https://www.fran.si/iskanje?View=1&Query=strokovnjak

Slovenian Qualifications Framework - Slovensko ogrodje kvalifikacij [Slovenian framework of qualifications] (n.d.). https://www.nok.si/sites/www.nok.si/files/doc-

uments/sokbrosura_strokovna_155x295_eng_potrditev2.pdf
Soeiro, A., Golith, K., Bochar, D., Kiefer, T., Videncova, Z., & Krstelj, V. (2017). Dokumentiranje in vrednotenje neformalnih in priložnostnih izobraževanj za inženirje. [Documentation and evaluation of non-formal and informal training for engineers]. *Glasilo Zveze inženirskih društev Maribor*. *3*, 66–76. https://zid-mb.si/wp-content/uploads/2020/03/GlasiloZID_2017_3_splet.pdf
Tangaraja, G., Mohd Rasdi, R., Abu Samah, B., & Ismail, M. (2016). Knowledge sharing is knowledge transfer: a misconception in the literature. *Journal of Knowledge Management*, *20*(4), 653–670. http://doi.org/10.1108/jkm-11-2015-0427
Wang, S., & Noe, R. A. (2010). Knowledge sharing: A review and directions for future research. *Human Resource Management Review, 20*(2), 115–131. http://doi.org/10.1016/j.hrmr.2009.10.001
Wang, P., Tong, T. W., & Koh, C. P. (2004). An integrated model of knowledge transfer from MNC parent to China subsidiary. *Journal of World Business*, *39*(2), 168-182. http://doi.org/10.1016/j.jwb.2003.08.009
Wiig, K. M. (1997). Knowledge management: an introduction and perspective. *Journal of Knowledge Management*. http://doi.org/10.1108/13673279710800682
Yang, Y. (2019). Evolutionary Game and Alliance Management Analysis of tacit knowledge flow in Enterprises. In 2019 4th International Conference on Financial *Innovation and Economic Development (ICFIED 2019)*. Atlantis Press. http://doi.org/10.2991/icfied-19.2019.40
ZGD-1. (2009, 14. avgust). *Poslovno knjige in letno poročilo.* [Business records and annual report]. https://zakonodaja.com/zakon/zgd-1/55-clen-mikro-majhne-srednje-in-velike-druzbe
Zopiatis, A., Krambia-Kapardis, M., & Varnavas, A. (2012). Y-ers, X-ers and Boomers: Investigating the multigenerational (mis)perceptions in the hospitality workplace. *Tourism and Hospitality Research, 12*(2), 101–121. http://doi.org/10.1177/1467358412466668

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Medgeneracijske razlike in prenos znanja med slovenskimi inženirji

Ozadje in namen: Namen raziskave je bil proučiti vpliv medgeneracijskih razlik na izmenjavo znanja med inženirji v velikih slovenskih izdelovalnih gospodarskih družbah.
Metoda: V delfski tehniki strokovnjaki odgovorijo na odprta vprašanja. Proces se zaključi v doseženem konsenzu tretjega kroga. Nastali vprašalnik se razdeli med inženirje vseh starostnih skupin, delujočih v velikih izdelovalnih organizacijah.
Rezultati: Strokovnjaki navedejo, da so medgeneracijske razlike vidne na delovnem mestu in se najbolj odražajo v računalniški pismenosti ter uporabi informacijsko-komunikacijske tehnologije. Uspešnost generacije in raznolikost prinese pospešen osebnostni razvoj ter napredek organizaciji, izmenjava znanja steče, če je poskrbljeno za zaposlene, zgledno vodenje in vzpostavljeno organizacijsko kulturo. Obstaja statistična značilnost medgeneracijskih razlik na izmenjavo znanja med inženirji v velikih izdelovalnih organizacijah ($p < 0,001$).
Zaključek: Izsledki raziskave menedžmentu pokažejo, da je poznavanje medgeneracijskih razlik in skrb za človeške zmožnosti del doprinosa k uspešnosti organizacije. Raziskava je omejena na inženirje, ki posedujejo inženirsko znanje in delujejo v izdelovalnih organizacijah v slovenskem prostoru. Predlagamo raziskovanje organizacij v geografsko širšem prostoru

Ključne besede: *Znanje, Izmenjava znanja, Generacije, Medgeneracijske razlike, Organizacija, Inženirji, Izdelovalne organizacije*