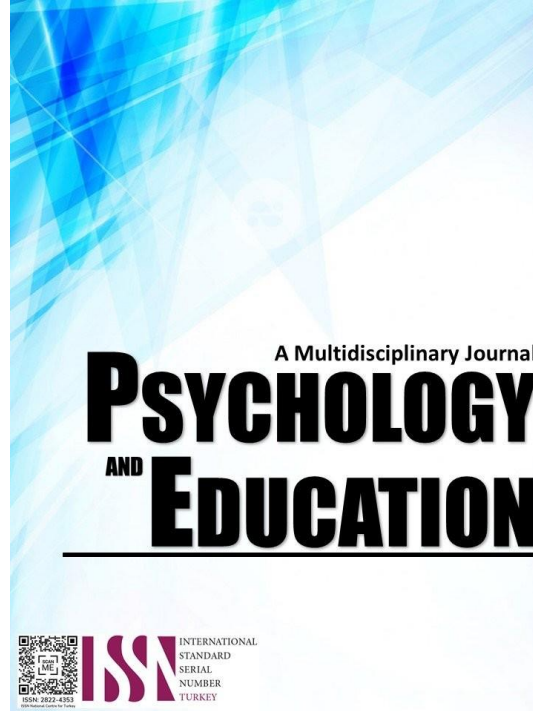


DIGITAL TECHNOLOGIES ON PERSONNEL ENGAGEMENT AND RETENTION IN HUMAN RESOURCE MANAGEMENT 4.0



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Digital Technologies on Personnel Engagement and Retention in Human Resource Management 4.0

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Abstract

This research examines the influence of digital technologies on personnel engagement and retention within companies in Taguig City, Philippines, through the lens of HRM 4.0. The study explores how digital employee experience, digital communication and collaboration, and digital accessibility as measures of personnel engagement influence personnel retention. Using a quantitative research design, data were collected from 400 employees via an online survey. Exploratory factor analysis (EFA) was utilized to assess the uniqueness and reliability of the study's factors, ensuring that each factor had a communality value of at least .40. Subsequently, confirmatory factor analysis (CFA) was conducted using IBM SPSS Amos V.21 to validate the proposed model and confirm its fit with the collected data, and a range of statistical tests were performed to evaluate the relationships between variables. The findings indicate that a positive digital employee experience is associated with higher personnel retention, while excessive digital communication and collaboration can negatively affect both the length of service and retention. Moreover, longer length of service is associated with higher retention rates, emphasizing the importance of sustained engagement. The study also shows that younger employees engage more positively with digital technologies, and that the effectiveness of these technologies varies with the length of service. These results highlight the necessity for HR strategies that integrate digital interactions and customize approaches for different age groups. Finally, this paper highlights the study's contributions to theoretical and policy implications, empirical findings, and suggests areas for further research.

Keywords: *Digitalization, Digital Technologies, HRM 4.0, Personnel Engagement, Personnel Retention*

Introduction

The advent of contemporary digital trends and technologies has revolutionized the functioning of organizations and transformed the nature of work, causing significant disruptions to all aspects of business operations. Hizam et al. (2023) stated that the convergence of Industry 4.0 and the consequences brought about by the COVID-19 pandemic has necessitated a shift towards increased digitalization and virtualization in different domains such as business, governance, and education. The emergence of Human Resource Management 4.0 (HRM 4.0) has been accelerated by the advancements in digitalization and robotics, which has facilitated the rise of Industry 4.0. The integration of technologies stemming from Industry 4.0 within the human resource sector has led to the emergence of a fresh concept that enhances agility and prioritizes the welfare of workers. As a result, the current situation taught people to become more efficient in embracing tech tools and to be more patient in learning technologies and interacting virtually. Managing employees and retaining key personnel are crucial responsibilities in navigating the highly competitive landscape of the modern business environment. Sathyavathi and Angayarkanni (2020) suggested that to keep the organization competitive, the management must ensure that employees have the necessary tools so that they can perform their tasks effectively in a new working environment to contribute to the attainment of organizational objectives. However, the participation of a motivated workforce serves as a crucial indicator of organizational progress and development. Despite the transformative impact of technologies on work processes, digital transformation necessitates the integration of essential human skills to ensure the usability and effectiveness of digital technologies. Da Silva et al. (2022) defined 'HRM 4.0' as a digital approach to leadership and management of HR functions. It signifies the incorporation of information technology and the implementation of innovative HR system designs and processes. HRM 4.0 holds the capability to improve personnel engagement and retention through the utilization of digital technologies, streamlining human resource processes, facilitating personalized employee experiences, and enabling data-driven decision-making for effective talent management. This empowers organizations to cultivate a more captivating workplace, foster positive employee experiences, and optimize HR practices to attract, nurture, and retain exceptional talent. Employees tend to perform effectively when they are engaged in the company's activities (Gomathy et al., 2022). Even if your employees possess positive attitudes and high levels of engagement, their productivity can still be limited without the right technology.

However, other concepts warrant exploration. Notably, various studies have consistently highlighted the potential advantages of integrating digital technologies into human resource practices and experiences, shedding light on their possible implications. Now, this research aims to determine the influence of digital technologies on personnel engagement and retention that could be modified in a way that would enhance human resource processes and practices of various organizations. It is envisaged that this study will lead to an increased awareness and knowledge of the importance of utilizing digital technologies in managing people employed and the need for further research in the subject area.

Literature Review

Human Resource Management 4.0

The advancement of digital technologies is intimately interconnected with the human revolution. While technological innovations drive

the Fourth Industrial Revolution, it is the people who hold the key to unlocking its potential within the realm of business. Industry 4.0 presents countless opportunities for organizations to embrace technological advancements, facilitating quicker and more efficient operations. The automation of HR processes through innovative technologies like the Internet of Things, artificial intelligence, and big data is giving rise to HR 4.0 transforming traditional HR functions. The integration of Industry 4.0 components is contributing to improvements in several HR operations (Rafique et al., 2021). According to Bissola and Imperatori (2020), the world of technology has been witnessing a rapid and dynamic wave of innovation. This trend, which commenced in the early years of the current decade, has steadily emerged and is poised to have a prevalent impact on businesses of all scales. Its transformative influence on the nature of work is anticipated to be substantial. A new wave of technological advancements was primarily focused on developing tools that could replicate and, ideally, enhance various human capacities. Thus, Industry 4.0 brought the emergence of a progressive digitalization of the entire value chain and the subsequent interconnectedness of individuals, objects, and systems extending beyond the boundaries of the organization through the exchange of real-time data. Moreover, HRM 4.0 is revolutionizing the nature of work, incorporating both traditional employees and managers, as well as a diverse range of external workers who collaborate across organizational boundaries, driven by the advancements of digital platforms (Liboni et al., 2019).

Managers are leveraging Industry 4.0 elements to enhance decision-making, optimize resource utilization, and improve employee satisfaction and engagement. It was also revealed that the majority of the respondents perceived that HRM practices became more efficient and effective in the era of Industry 4.0. Thus, the incorporation of Industry 4.0 components is leading to the advancement and increased efficiency of HRM functions, resulting in improved organizational outcomes. Sakarina et al. (2022) affirmed that as the transition to Industry 4.0 takes place, the primary challenge is to prioritize the role of humans in technological innovation to ensure sustainable human resource management. Digital transformation encompasses the organizational shift caused by digital technologies. A key aspect of this is cultivating a positive and engaged workforce within the organization. It is widely acknowledged that implementing strategies and tools that promote employee happiness and engagement not only leads to more productive practices but also fosters a culture of innovation, ultimately making companies more competitive.

Elements of Digital Influence on Personnel Engagement

Several studies have shown that these changes have a positive impact on both employees and organizations. HRM 4.0 offers employees greater control of their work schedules, integrates employee well-being initiatives, gives employees a sense of autonomy and empowerment (Salvadorinho & Teixeira, 2023), enables personalized learning experience, provides transparent data-driven insights and feedback (Rassameethes et al., 2021), facilitates workplace collaboration and communication (Fregnan et al., 2020), and fosters inclusivity through digital communication channels (Imperatori et al., 2019). Despite having numerous advantages, HRM 4.0 still carries certain potential risks and challenges such as diminishing human interaction due to excessive dependence on digital technologies, increasing stress (Cunha et al., 2022), declining employee engagement and increasing workforce turnover due to more demanding skills and competency requirements (Kucharčíková et al., 2021), and monitoring concerns on employee performance and data privacy (Ejsmont, 2021), which could potentially lead to decreased employee engagement.

Digital Employee Experience

Deng et al. (2022) affirmed that how employees perceive digital technology is linked to their willingness to accept digital transformation. When employees are proficient in using digital tools, they tend to have a positive attitude toward digital change, thereby reducing any resistance. Numerous researches found that companies with highly engaged cultures find it easier to recruit top talent, experience lower employee turnover, and tend to be highly profitable (Maylett & Wride, 2017; Yildiz et al., 2020). Thus, it is the responsibility of the organization to cultivate a desired culture of fully adopting digital technologies. For an effective talent retention, HR and business leaders should acknowledge the pervasive role of applications and digital technologies in shaping the employee experience (Akter et al., 2023; Wang et al., 2021). It is equally important to recognize that employees themselves are actively engaged in improving their digital interactions. This suggests that when employees are engaged in their work environment, they develop a sense of dedication and loyalty to the organization (Ibrahim & Al Falasi, 2014). By ensuring a consistently smooth and user-friendly digital employee experience, employers can take a significant progress in creating and keeping a workforce that is highly engaged, motivated, and productive.

Hypothesis 1: Digital employee experience has a significant direct influence on the (a) length of service in the organization and (b) personnel retention

Digital Communication and Collaboration

Employee engagement is a critical element that influences employee retention in the workplace. Clarity in roles and the significance of tasks are key drivers of employee engagement. In a quantitative study conducted by Mitchell (2015), it became evident that the amount of time managers spend communicating with their employees directly impacts employee's level of engagement. It is important to emphasize that engagement goes beyond the simple exchange of emails, video conferences, and phone calls. Hamburg (2019) stated that a significant number of employees would willingly choose a lower-paying position if it allows them to work remotely. While technology has allowed numerous employees to continue their work during the crisis, there exists a tangible danger of experiencing digital fatigue due to an excess of virtual meetings and online project tasks. Effectively managing screen time poses a significant

challenge in ensuring digital well-being. In a conversation with respondents, they shared their attempts at maintaining discipline by turning off portable devices and scheduling breaks. In addition, a particular study by Adisa et al. (2021) investigated the adverse aspects like online presenteeism and technology distractions arising from the extensive use of ICT tools. It was revealed that continuous online presence, where employees are expected to be constantly available, has a diminishing effect on employee engagement and retention. The struggle arises from the blurred boundaries between work and personal life (Bondanini et al., 2020), tight deadlines, an overload of emails, and the perceived necessity to maintain visibility (Harunavamwe & Ward, 2022).

The study of Bhuvanewari et al. (2022) found that the lines differentiating work from personal life have become increasingly unclear due to the increased use of digital technologies. Employees frequently find themselves connected to their digital or mobile devices, making it challenging to establish a clear work-life balance. This issue became even more challenging during the COVID-19 pandemic when working from home became the new norm. These findings suggest that the idea of work-life balance has evolved, and now it is not so easy to keep them completely separate. Digitalization has changed the way employees work and connect with others. Nevertheless, some individuals have been pleasantly surprised by the extent of collaboration achievable through video platforms. As technology integrates into workplaces, organizations need to prepare their teams for ongoing changes to stay successful in the long run. Rather than just chasing the newest tech trends, HR professionals and business leaders should team up to craft smart plans that strike the right balance between people and technology, meeting the needs of both the organization and its workforce. The report highlighted that numerous employees may not be prepared or fully aware of how technological changes can influence their roles and daily tasks. Only a small number have received appropriate training and participated in conversations about utilizing new technologies to prepare for upcoming changes. In addition, Kot (2022) significantly found that regularly conducting digital engagement surveys can boost employee engagement by streamlining communication and bridging physical gaps. Thus, the following hypothesis is proposed:

Hypothesis 2: Digital communication and collaboration has a significant direct influence on the (a) length of service in the organization and (b) personnel retention

Digital Accessibility

Employees are vital to digital transformation, particularly in making decisions and integrating resources within a digital setting, and gaining access to professional resources. Their involvement not only improves their relationship with the organization but also boosts the effectiveness of digital initiatives (Li et al., 2024). Digital accessibility is a key requirement for creating an inclusive digital environment, but many areas of the digital world are still not accessible to everyone (Lewthwaite et al., 2023). Moreover, transformational leaders are seen as role models and mentors who motivate employees to get involved in organizational activities. Support from supervisors, along with training, guidance, and access to information, contributes to better employee retention (Ooi et al., 2021). For this reason, organizations can assist their employees by offering access to digital tools that can enhance employees' overall well-being (Mustafa, 2017).

Hypothesis 3: Digital accessibility has a significant direct influence on the (a) length of service in the organization and (b) personnel retention

Personnel Retention

Digital technologies and tools have instigated significant shifts in the way people approach their work, influencing their levels of engagement. Ongoing trends favoring remote work and flexible work schedules continue to be appealing in the future work environment. Although digital tools empower employees to decide their work location, schedule, and work approach, they also pose challenges including the need for optimal working conditions, potential conflicts between work and personal life, and reduced direct interaction with colleagues. Human resource managers have the opportunity to strategize and implement approaches for effectively leveraging digital technologies. Thus, younger generations who have been immersed in modern technologies will contribute to the growing prevalence of remote work, flexible scheduling, and the emphasis on achieving a work-life balance. Acknowledging the crucial role that engaged employees play in the effective functioning of organizations, it is evident that this task is not merely an optional task for managers, but rather an essential responsibility. Similarly, the findings of Goswami and Upadhyay (2019) support the notion that different elements of embracing digital transformation can serve as signs of employee involvement.

There exist a positive correlation between digital technologies and employee engagement which leads to the retention of people employed (Stofberg et al., 2021; Ekhsan et al., 2023). It was concluded that digital technologies generally boost employee engagement, but organizations should not ignore the potential downsides. Furthermore, managers need to use digital tools wisely to encourage employee engagement and the retention of valued skills. Habachi et al. (2022) confirmed that digitalization has a significant effect on employee recruitment and retention. In the study of Guerra et al. (2023), it was established that digital technologies significantly influence employee retention leading to digital transformation adoption. In addition, the adoption of digital technology in the workplace is intricately tied to and influences the ability to retain employees.

Bencsik and Juhász (2023) confirmed that specific demographic traits play a role in the stress caused by technology. Technological changes have a greater impact on men than on women, and individuals aged 45 and above generally experience these challenges more intensely. People with a secondary education find it harder to cope with stress induced by technology, while graduates often experience a greater sense of uncertainty. Thus, managers tend to feel a heightened sense of uncertainty and threat due to the frequency of strategic

decisions. Accordingly, the following hypotheses are proposed:

Hypothesis 4: There are significant differences in the respondents' assessments of the influence of digital technologies on their level of personnel engagement based on their demographic profile: (a) gender, (b) age, (c) length of service, and (d) education

Hypothesis 5: Educational attainment has a significant direct influence on personnel retention

Hypothesis 6: Length of service in the organization has a significant direct influence on personnel retention

Methodology

Respondents

In this research, the respondents consisted of four hundred (400) employees from selected companies in Taguig City, Philippines. The optimal sample size using Slovin's formula was computed to meet the desired statistical constraints with a confidence level of 95%, a 5% margin of error, and an estimated annual employed individuals population of 405,000 for the year 2022 (Philippine Statistics Authority, 2022). See Table 1 for the profile of the respondents in terms of gender, age, length of service, and highest educational attainment.

Table 1. *Profile of the Respondents*

	<i>Characteristics</i>	<i>Frequency</i>	<i>Percentage</i>
Gender	Male	180	45%
	Female	220	55%
Age	24 yrs. old & Below	150	37.5%
	25 to 34 yrs. old	156	39%
	35 to 44 yrs. old	50	12.5%
	45 yrs. old & Above	44	11%
Length of service	Less than 3 years	174	43.5%
	3 to 5 year	158	39.5%
	6 to 8 years	26	6.5%
	9 years & Above	42	10.5%
Highest educational attainment	Bachelor's Degree	324	81%
	Earned Units in Master's Program	36	9%
	Master's Degree	30	7.5%
	Earned Units in Doctoral Program	6	1.5%
	Doctoral Degree	4	1%

Instrument

The self-made questionnaire was the primary method used in collecting data for this study. This research utilized a quantitative research approach using a survey questionnaire which was distributed to employees of selected companies. The questionnaire is composed of three main parts. Part I contains the demographic profile of the respondents, Part II presents the respondent's assessment of the influence of digital technologies on the level of personnel engagement. Then, Part III examines the extent to which digital technologies influence personnel retention.

Procedure

Data were gathered through an online questionnaire and survey platform. The survey was disseminated through email and messaging applications, resulting in responses from 400 participants.

Data Analysis

The survey results from the questionnaire were analyzed and interpreted using SPSS V.20. The researcher conducted exploratory factor analysis (EFA) to evaluate the distinctiveness and reliability of the factors in the study, ensuring that each construct met a communality threshold of at least 0.40. Following this, confirmatory factor analysis (CFA) was performed using IBM SPSS Amos V.21 to assess whether the data sufficiently supported the proposed model, based on fit indices. The survey utilized a 4-point Likert scale (Great Extent, Moderate Extent, Small Extent, No Extent) with five items per variable, designed to gauge respondents' perceptions of how digital technologies influence their engagement levels and potential for personnel retention. In addition, ANOVA, Levene's test for equality of variances, and Welch's ANOVA were conducted to ascertain if the assumption of equal variances holds. Subsequently, post hoc tests such as Tukey's HSD and Tahmane were utilized to pinpoint specific departmental pairs exhibiting significant disparities among variables. These statistical approaches collectively aim to provide a thorough analysis of the research data.

Ethical Considerations

This study received ethical approval from the Ethics Review Committee. Thus, respondents were guaranteed that their involvement was voluntary and that they could opt out at any point without any repercussions to their employment. Data collected electronically were securely stored on a password-protected computer to maintain confidentiality. Additionally, the data consent form specified that

the responses would be utilized for the publication of the research findings.

Results and Discussion

Item Analysis

A construct reliability (CR) significance test was conducted to assess and remove items with inadequate correlation coefficients. Items with corrected item-total correlations below 0.30 were excluded from the analysis. Specifically, items 7, 10 and 25 were removed, resulting in a final total of 24 items retained for further analysis.

Exploratory Factor Analysis of Personnel Engagement Construct

Out of the total data points ($n = 400$), half ($n = 200$) were randomly chosen for item analysis and exploratory factor analysis (EFA). During the analysis, item 12 was deleted because its communality value was less than 0.40. The remaining items were retained for further factor analysis leading to the removal of items 16, 19 and 20 due to significant cross-loadings and lack of relevance to other items.

Using SPSS 20.0 statistical software, EFA was conducted on the remaining 20 items. The KMO and Bartlett's sphericity tests confirmed that the samples were suitable for factor analysis. The KMO score was 0.633 indicating a moderate sampling adequacy for factor analysis, and the Bartlett Sphericity test was significant ($\chi^2 = 5026.267$, $df = 210$, $p < .000$). These results indicate that there are common factors among the correlation matrices of the data, making the questionnaire appropriate for EFA. Principal component analysis (PCA) was used to extract factors and communalities from the items, resulting in the factor loading matrix. EFA was performed and the results identified three distinct factors. Factor 1 comprises 5 items with loadings ranging from 0.896 to 0.966, indicating strong associations with this factor. Factor 2 includes 5 items with loadings between 0.640 and 0.932, and factor 3 consists of 5 items with loadings from 0.671 to 0.934. For the factor – personnel retention, it is represented by 5 items with loadings ranging from 0.634 to 0.947. See Table 2 for the specific loading values for each factor.

Reliability Analysis

After screening, the internal consistency coefficient (Cronbach's α) for the entire personnel engagement and retention questionnaire was 0.728, demonstrating internal consistency and indicating that the instrument assesses the same underlying construct. The reliability coefficients for the individual factors of personnel engagement were as follows: digital employee experience (.973), digital communication and collaboration (.903), digital accessibility (.826), and personnel retention (.871). These results indicate that the questionnaire has a highly reliable index.

Table 2. *Exploratory Factor Analysis (EFA) Results*

Items	Code	Loadings	Comm. value	Cronbach α
Digital Employee Experience(DEX)				
5. Employees express higher job satisfaction when digital technologies simplify and streamline work processes.	DEX1	.966	.932	.951
11. The integration of digital technologies positively influences employee performance through efficient task management.	DEX2	.952	.920	.922
14. Digital collaboration has positively impacted the speed and efficiency of project completion.	DEX3	.958	.928	.943
The accessibility of digital resources for professional growth and skill enhancement contributes to employee motivation.	DEX4	.896	.809	.849
21. Employees appreciate the impact of digital technologies on performance through data-driven insights and analytics.	DEX5	.960	.932	.946
Digital Communication and Collaboration (DCCo)				
3. Employees find that digital tools contribute to a more collaborative and communicative work culture.	DCCo1	.925	.864	.851
4. Employees appreciate the motivational impact of digital platforms that support collaborative projects and achievements.	DCCo2	.835	.756	.798
6. Digital tools that facilitate work-life integration contribute to higher job satisfaction.	DCCo3	.932	.886	.884
9. The use of digital platforms allows for real-time acknowledgment of employee contributions, enhancing motivation.	DCCo4	.640	.437	.548
18. Employees feel more satisfied when digital technologies contribute to a collaborative and inclusive workplace culture.	DCCo5	.899	.786	.748
Digital Accessibility(DAcc)				
1. The organization encourages continuous learning through the integration of digital training programs.	DAcc1	.934	.861	.838
2. Continuous communication through digital platforms ensures that employees are informed about organizational changes.	DAcc2	.719	.532	.598
8. Digital tools contribute to enhanced employee performance by providing	DAcc3	.671	.546	.551

real-time access to relevant information.

13. Employees find it easier to contribute to group discussions and collaborative projects through digital platforms. DAcc4 .695 .473 .496

15. Employees perceive digital technologies as crucial tools for staying updated on industry trends and skills. DAcc5 .873 .755 .743

Personnel Retention (PRet)

22. How effectively do digital feedback tools help you feel your feedback is received and acted upon? PRet1 0.634 0.402 0.489 .871

23. How has the use of digital technologies in your role increased your job satisfaction? PRet2 0.947 0.896 0.911

24. How satisfied are you with the digital tools and platforms available for your growth and development opportunities? PRet3 0.893 0.797 0.818

26. How have digital career development tools helped align your role with your career goals? PRet4 0.840 0.706 0.719

27. How likely are you to stay with your organization due to the support and resources provided by digital technologies? PRet5 0.821 0.674 0.708

Confirmatory Factor Analysis (CFA) of Personnel Engagement and Retention Construct

Based on the results of the EFA, a Confirmatory Factor Analysis was performed using IBM SPSS Amos 21.0 on the other half of the dataset (n = 200). This analysis aimed to evaluate the fit of the three-factor model for personnel engagement, which include digital employee experience, digital communication and collaboration, and digital accessibility. The SEM evaluates the proposed relationships in a model by assessing how well the model fits the data and estimating the parameters for each connection (see Figure 1). Using AMOS for SEM, researchers can refine the model by adjusting the proposed framework and utilizing modification indices Arbuckle (2005).

Following model adjustments, the CFA demonstrated strong support for the complete model, as indicated by the fit indices (NFI=0.900 = 0.90, IFI=0.935> 0.90, CFI=.933> .90, $\chi^2/df = 2.703 < 3.0$, RMSEA = 0.037 < 0.08). These results suggest that the model is a good fit for the data and validate the multi-dimensional structure of the Personnel Engagement and Retention Questionnaire. See Table 3 for the summary of overall fit indexes of the model.

As shown in Table 4, the analysis reveals that digital communication and collaboration significantly and negatively influences length of service (-0.396, p=0.019). Regarding personnel retention, digital employee experience demonstrates a significant positive relationship (0.258, p<0.000), suggesting that increased digital employee experience is associated with higher retention levels. Digital communication and collaboration is significantly negatively correlated with personnel retention (-0.145, p<0.000), indicating that higher digital communication and collaboration corresponds to lower retention. All other relationships were found to be statistically non-significant.

Noticeably, length of service has a significant positive relationship with personnel retention (0.347, p<0.000), suggesting that length of service is linked to higher retention rates.

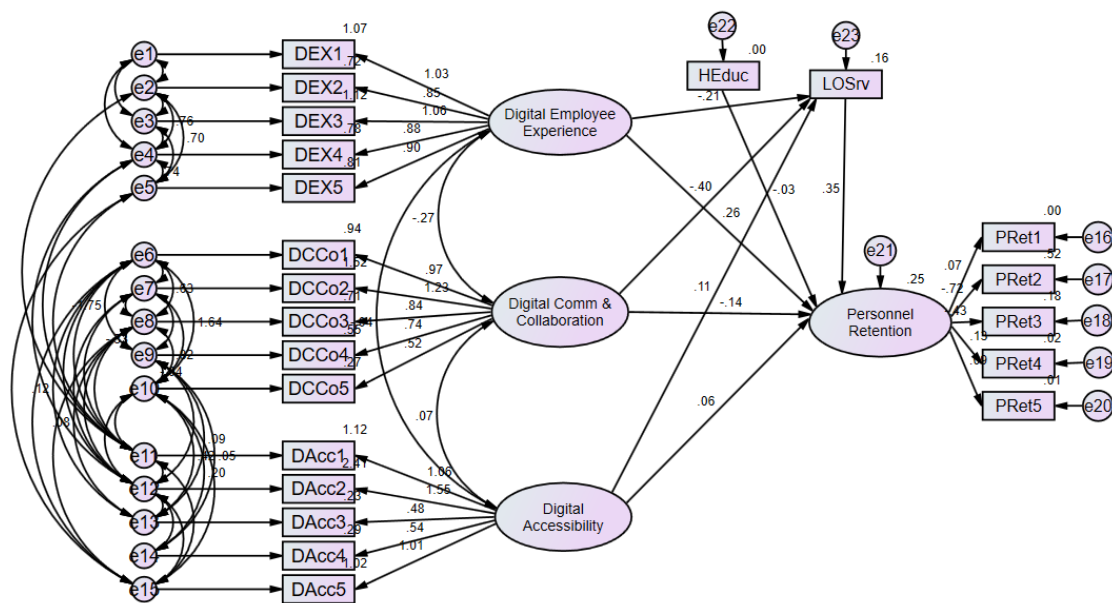


Figure 1. Results of Structural Equation Model (SEM)



Table 3. Summary of Overall Fit Indexes of the Model

Model	χ^2	df	χ^2/df	NFI	RFI	IFI	TLI	CFI	FMIN	RMSEA
Value	416.215	154	2.703	.900	.836	.935	.890	.933	.327	.037
Criteria			< 3	> .90	> .90	> .90	> .90	> .90	< 1	< .08

Table 4. Hypothesis Testing Based on the Results of SEM

Hypothesis	Independent and Dependent Variables	Direction	Est.	S.E.	C.R.	p-value
H1 (a)	Digital Employee Experience → Length of Service	-	-.210	.133	-1.576	.115
H2 (a)	Digital Communication and Collaboration → Length of Service	+	-.396	.169	-2.344	.019
H3 (a)	Digital Accessibility → Length of Service	-	.113	.223	.506	.613
H1 (b)	Digital Employee Experience → Personnel Retention	+	.258	.027	9.573	***
H2 (b)	Digital Communication and Collaboration → Personnel Retention	+	-.145	.035	-4.133	***
H3 (b)	Digital Accessibility → Personnel Retention	-	.057	.046	1.242	.214
H5	Highest Educational Attainment → Personnel Retention	-	-.028	.133	-2.213	.831
H6	Length of Service → Personnel Retention	+	.347	.098	3.543	***

*p<0.05, **p<0.01, ***p<0.001

Internal Relationship among Variables

Table 5 illustrates the interrelationships among different factors. A notable positive correlation exists between length of service and highest educational attainment, with a correlation coefficient of 0.267 (p<0.01). Conversely, digital communication and collaboration exhibit negative correlations with other variables, including length of service (r= -0.362, p<0.01) and highest educational attainment (r= -0.398, p<0.01). Personnel retention shows a considerable but significant positive correlation with digital accessibility (r= 0.156, p<0.05).

Table 5. Correlation Matrix between Factors

Factors	Mean	SD	1	2	3	4	5	6
Length of Service	1.84	0.95	1	-	-	-	-	-
Highest Educational Attainment	1.33	0.76	.267**	1	-	-	-	-
Digital Employee Experience	3.65	0.45	-0.104	0.060	1	-	-	-
Digital Communication and Collaboration	3.80	0.36	-.362**	-.398**	-.299**	1	-	-
Digital Accessibility	3.96	0.16	0.122	0.065	0.078	0.139	1	-
Personnel Retention	3.99	0.11	-0.070	0.058	-0.014	-0.041	.156*	1

* Correlation is significant at the 0.05 level (2-tailed).
 ** Correlation is significant at the 0.01 level (2-tailed)

Characteristics of Respondents' Engagement Level

Gender-based Differences

The independent samples t-tests and Levene's test for equality of variances were conducted to examine differences between gender groups across various variables as shown in Table 6. The analysis demonstrated no significant differences between male and female respondents in any of these areas. For digital employee experience, the results of Levene's test (F=.170, p=.680) and the t-test (t(398) = .232, p=0.817) indicated no meaningful variation between genders. Similarly, the tests for digital communication and collaboration (F=.591, p=.442; t(398)= -.113, p=.910) and digital accessibility (F=1.278, p=.259; t(398)=.565, p=.573) revealed no significant gender differences. These outcomes suggest that gender does not play a significant role in influencing digital engagement levels in this study.

Table 6. Gender-based Differences of Respondents' Engagement Level

		Levene's Test for Equality of Variances*		t-test for Equality of Means	Results
		F	Sig.	Sig. (2-tailed)	
H4 (a)	Digital Employee Experience	.170	.680	.817	Rejected
H4 (a)	Digital Communication and Collaboration	.591	.442	.910	Rejected
H4 (a)	Digital Accessibility	1.278	.259	.573	Rejected

*Equal variances assumed

Age-based Differences

The one-way ANOVA findings (see Table 7) show significant variations in digital engagement across different age groups for all three variables: digital employee experience (F(3, 396)=164.355, p<.001), digital communication and collaboration (F(3, 396)=25.617, p<.001), and digital accessibility (F(3, 396)=32.016, p<.001). Welch's tests further confirmed these results, revealing significant differences for digital employee experiences (Welch's F(3, 156.789)=130.556, p<.001), digital communication and collaboration (Welch's F(3, 112.329)=35.850, p<.001), and digital accessibility (Welch's F(3, 165.467)=22.833, p<.001).



The post hoc analysis using Tamhane’s T2 shows that individuals aged 24 years and below report higher levels of digital employee experience, digital communication and collaboration, and digital accessibility compared to other age groups. These results indicate that digital engagement levels are significantly influenced by age, emphasizing the importance of considering age when developing digital engagement strategies.

Table 7. Age-based Differences of Respondents’ Engagement Level

		Robust Tests of Equality of Means (Welch)				Results
		ANOVA				
		F	Sig.	Statistica	Sig.	
H4 (b)	Digital Employee Experience	164.355	.000	130.556	.000	Supported
H4 (b)	Digital Communication and Collaboration	25.617	.000	35.850	.000	Supported
H4 (b)	Digital Accessibility	32.016	.000	22.833	.000	Supported

Asymptotically F distributed.

Length of Service-based Differences

The ANOVA results (see Table 8) highlight significant differences in digital engagement based on length of service across three variables: digital employee experience (F(3, 396)=11.477, p<.001), digital communication and collaboration (F(3, 396)=10.808, p<.001), and digital accessibility (F(3, 396)=3.651, p=.013). These differences were further supported by Welch’s tests, confirming the significance for digital employee experience (Welch’s F(3, 111.639)=20.286, p<.001), digital communication and collaboration (Welch’s F(3, 84.981)=11.153, p<.001), and digital accessibility (Welch’s F(3, 99.795)=5.095, p=.003).

Post hoc analysis using the Tamhane test reveals that employees with less than 3 years of service demonstrate significantly higher digital employee experience compared to those with 3 to 5 years (MD= .23079, p<.001), while those with 6 to 8 years of service show a significant decrease in digital employee experience compared to those with less than 3 years. Similarly, those with less than 3 years of service report higher digital communication and collaboration, and digital accessibility compared to those with 3 and above years of service. These findings suggest that newer employees tend to engage more actively with digital platforms, while those with longer service might experience diminishing engagement.

Table 8. Length of Service-based Differences of Respondents’ Engagement Level

		Robust Tests of Equality of Means (Welch)				Results
		ANOVA				
		F	Sig.	Statistica	Sig.	
H4 (c)	Digital Employee Experience	11.477	.000	20.286	.000	Supported
H4 (c)	Digital Communication and Collaboration	10.808	.000	11.153	.000	Supported
H4 (c)	Digital Accessibility	3.651	.013	5.095	.003	Supported

Asymptotically F distributed.

Education-based Differences

The ANOVA results (see Table 9) show no significant differences among education levels for digital employee experience (F(4, 395)=.590, p=.670), digital communication and collaboration (F(4, 395)=2.270, p=.061), and digital accessibility (F(4, 395)=.115, p=.977). However, there is a statistically significant difference in digital employee experience (Welch’s F(4, 15.948)=4.163, p=.017) when considering all groups together and their specific comparisons.

The Tamhane post hoc test for digital employee experience indicates no significant differences across educational levels, as all p-values are greater than 0.05. In addition, the Tukey HSD analysis for digital communication and collaboration, and digital accessibility indicates no significant differences across educational levels. This suggests that educational attainment does not significantly influence digital employee experience, digital communication and collaboration, and digital accessibility within the groups examined.

Table 9. Education-based Differences of Respondents’ Engagement Level

		Robust Tests of Equality of Means (Welch)				Results
		ANOVA				
		F	Sig.	Statistica	Sig.	
H4 (d)	Digital Employee Experience	.590	.670	4.163	.017	Supported
H4 (d)	Digital Communication and Collaboration	2.270	.061	1.689	.209	Rejected
H4 (d)	Digital Accessibility	.115	.977	.247	.907	Rejected

Asymptotically F distributed.

The CFA results validate the three-factor structure from the exploratory factor analysis, encompassing digital employee experience, digital communication and collaboration, and digital accessibility. The model fit indices—including NFI, IFI, CFI, χ^2/df , and RMSEA—indicate a strong alignment with the data, confirming the effectiveness of these constructs in assessing employee engagement and retention. This supports the model’s ability to capture the complex dimensions of personnel engagement and its influence on

personnel retention. Digital employee experience was found to significantly influence personnel retention, hence confirms Hypothesis 1(b). Employees are generally more satisfied with their jobs when digital tools make daily tasks easier and more efficient. By reducing workload complexity, employees feel more productive and less overwhelmed, leading to better retention (Inegbedion et al., 2020; Bourlakis et al., 2023). Additionally, the use of digital systems that improve task management as completing tasks efficiently enhances satisfaction and gives employees a sense of achievement. These factors help create a positive work environment that encourages employees to stay. This result aligns with the studies of Tucker (2020) and Abhari et al. (2023) asserting that many companies now include the employee experience as a key part of their engagement plans. The ones with the best results often train their leaders, managers, and HR teams on how to enhance the employee experience. Moganadas and Goh (2022) revealed that employees have a more positive experience with digital tools when these tools are customized to fit their personal needs and preferences. Allowing employees to adjust the appearance and functionality of their digital resources also enhances their overall experience. The quality of the employee experience is crucial for organizational success as it directly influences engagement and retention. Positive workplace experiences typically lead to higher levels of engagement and commitment among employees (Zhenjing et al., 2022).

The empirical findings indicate that digital communication and collaboration have a significant negative effect on both length of service and personnel retention confirming Hypothesis 2. While digital communication can sometimes overwhelm employees, it is important to acknowledge that tools can promote collaboration and interaction toward a more connected work environment (Lane et al., 2024). Employees tend to feel more included, which can counterbalance the negative effects of technostress. However, if not managed well, overuse of these tools can lead to burnout (Yener et al., 2020), especially when work-life boundaries blur due to constant communication (Kim & Chon, 2022; Cousins & Robey, 2015). This suggests that increased digital communication and collaboration may contribute to reduced tenure due to factors like communication overload or job dissatisfaction caused by technostress (Califf et al., 2020; Nastjuk et al., 2023). This underscores the necessity for managing digital communication and collaboration strategies effectively to avoid potential negative effects. On the other hand, length of service has a significant positive effect on personnel retention, hence confirms Hypothesis 6, emphasizing the value of long-term engagement in maintaining employee retention. Nearly a third of employees leave new jobs within six months, with most departures occurring in the first three months, while millennials tend to aspire to a decade-long tenure in new positions (Dimovski, 2021). This implies that employees with longer service durations are more likely to continue their employment, highlighting that commitment deepens as time progresses. Consequently, prioritizing initiatives that foster and acknowledge long-term tenure can play a key role in achieving high retention levels.

Analysis of demographic factors showed that age significantly affects digital engagement, with younger employees experiencing higher levels of digital engagement compared to seasoned employees. This supports Hypothesis 4(b), highlighting the importance of considering age differences when designing digital engagement strategies. In addition, the findings revealed that the length of service plays a crucial role in shaping employees' digital experience, digital communication and collaboration, and digital accessibility. Therefore, Hypothesis 4(c) is supported, suggesting that the effectiveness of digital technologies in fostering engagement varies depending on how long an employee has been with the organization. Employees who have been with the organization for a longer time typically gain better access to resources for career growth. As they continue in their roles, they also experience improvements in digital technologies that boost their efficiency and motivation. With time, employees become more adept at using these tools, making them more effective for teamwork and communication. This ongoing digital support fosters a deeper sense of loyalty among long-serving employees. This highlights the importance of customizing digital engagement approaches based on tenure to better meet employees' needs and improve their overall experience (Bal et al., 2015). These findings offer a deeper understanding of how various factors interact to influence personnel engagement and retention in a digital environment.

Conclusions

This research sheds light on the significant influence that digital technologies have on employee engagement and retention. It shows that there is a complex relationship between the measures of personnel engagement—namely, digital employee experience, digital communication and collaboration, and digital accessibility—and personnel retention. Interestingly, it can be highlighted that the length of service plays a crucial role in keeping employees around. Employees who have been with the company longer are more likely to stay, which underlines the need for strategies that encourage long-term commitment. Recognizing and rewarding long-term service can be key to maintaining high retention rates, especially in today's digital work environment, where it is important to keep experienced employees for their knowledge and stability. Furthermore, it was found that factors like age and length of service greatly influence how engaged employees are with digital technologies. Younger employees tend to be more engaged digitally, and the effectiveness of these digital technologies varies based on how long employees has been with the company. This suggests that engagement strategies should be tailored to different employee groups, taking into account factors like age and length of service to better meet their needs and improve their overall digital experience. The findings provide a solid basis for future research and practical applications in developing digital engagement strategies that consider the diverse effects these technologies can have on different groups of employees. Understanding these connections and applying focused strategies will enable organizations to increase personnel engagement and improve personnel retention.

In this research, the findings are in line with HRM 4.0's goal of utilizing advanced technologies to improve HR practices. The research also points out the need to balance technological improvements with human aspects in HRM 4.0. This study highlight how digital technologies affect personnel engagement and retention under Human Resource Management 4.0 (HRM 4.0). It shows that measures

of personnel engagement—digital employee experience, digital communication and collaboration, and digital accessibility—play a significant and multifaceted role in influencing personnel retention. It demonstrates that strong personnel engagement is crucial for maintaining high retention rates, highlighting the importance of long-term employee relationships. This supports the idea that personnel engagement is closely tied to greater organizational commitment and stability, indicating that HR practices should not just focus on technology but also on fostering lasting employee connections. Additionally, the study reveals that the effectiveness of digital technologies in enhancing engagement levels can vary based on factors such as age and length of service. The differences in engagement levels among these groups suggest the need for tailored engagement strategies. This reinforces the idea that employee engagement should be customized to fit different segments of the workforce. Recognizing these demographic factors can help create better engagement strategies that meet diverse employee needs and improve overall digital effectiveness and satisfaction. Finally, this research adds to the discussion on digital transformation in HRM by highlighting the identified relationships and differences, which can help refine engagement approaches and foster a more engaged and satisfied workforce.

The results of this study offer significant insights for companies looking to improve personnel engagement and retention in the era of digital transformation under HRM 4.0. The findings indicate that while digital communication and collaboration are crucial in today's workplaces, they can have a negative effect on employee retention and length of service. This suggests that businesses must carefully control the amount and frequency of digital interactions to avoid issues like communication overload and stress related to technology use. Clear policies should be established to manage digital communication to safeguard employee well-being and maintain long-term engagement. Moreover, the positive association between digital employee experience and retention highlights the need for organizations to invest in high-quality digital tools that are well-suited to employees' needs. However, it also points out the drawbacks of relying solely on digital solutions for engagement. Companies should ensure that digital tools are adaptable, easy to use, and smoothly integrated into daily operations. Thus, HR strategies should be customized to address demographic differences with specific approaches for different age groups and lengths of service. For instance, younger employees might thrive with more interactive digital platforms, whereas more experienced employees may need personalized support and training to fully engage with digital tools. Tailoring digital engagement strategies in this manner can improve overall satisfaction and retention across the workforce. Finally, while the study endorses the use of digital technologies to boost personnel engagement, it also points out their limitations, especially regarding long-term retention. This calls for companies to take a more balanced approach to digital transformation in HRM. Human resource policies should not only focus on the latest technological advancements but also on building long-term relationships with employees.

References

- Abhari, K., Bhullar, A., Le, J. & Sufi, N. (2023). Advancing employee experience management (EXM) platforms. *Strategic HR Review*, 22(3), 102-107. <https://doi.org/10.1108/SHR-04-2023-0021>
- Adisa, T.A., Ogbonnaya, C., & Adekoya, O.D. (2021). Remote working and employee engagement: A qualitative study of British workers during the pandemic. *Information Technology & People*, 36(5), 1835-1850. <https://www.emerald.com/insight/content/doi/10.1108/ITP-12-2020-0850/full/html>
- Akter, S., Biswas, K., Vrontis, D., Cooper, S. C. L., & Tarba, S. Y. (2023). Mastering digital transformation in workforce management. *Production Planning & Control*, 1–8. <https://doi.org/10.1080/09537287.2023.2270465>
- Bal, P. M., van Kleef, M., Jansen, P. (2015). The impact of career customization on work outcomes: Boundary conditions of manager support and employee age. *Journal of Organizational Behavior*, 36(3), 421-440. <https://onlinelibrary.wiley.com/doi/epdf/10.1002/job.1998>
- Bencsik, A. & Juhász, T. (2023). The impact of technostress on organizational functioning. *Problems and Perspectives in Management*, 21(1), 230-241. <https://www.businessperspectives.org/index.php/journals/problems-and-perspectives-in-management/issue-420/the-impact-of-technostress-on-organizational-functioning>
- Bhuvanewari, G., Gokul, K. & Rajakumar, P.T.V. (2022). A study on impact of work from home on work life balance during Covid-19. *Webology*, 19(2), 3068-3074. <https://www.webology.org/abstract.php?id=1619>
- Bissola, R., & Imperatori, B. (2020). *HRM 4.0 for human-centered organizations* (1st ed.). Advanced Series in Management, 23. Bingley, UK: Emerald Publishing Limited.
- Bondanini, G., Giorgi, G., Ariza-Montes, A., Vega-Muñoz, A. & Andreucci-Annunziata, P. (2020). Technostress dark side of technology in the workplace: A scientometric analysis. *International Journal of Environmental Research and Public Health*, 17(21). <https://doi.org/10.3390/ijerph17218013>
- Bourlakis, M., Nisar, T., & Prabhakar, G. (2023). How technostress may affect employee performance in educational work environments. *Technological Forecasting and Social Change*, 193, 122674. <https://doi.org/10.1016/j.techfore.2023.122674>
- Califf, C. B., Sarker, S., & Sarker, S. (2020). The bright and dark sides of technostress: A mixed-methods study involving healthcare IT. *MIS Quarterly*, 44(2), 809–856. <https://doi.org/10.25300/MISQ/2020/14818>

- Cousins, K., & Robey, D. (2015). Managing work-life boundaries with mobile technologies: An interpretive study of mobile work practices. *Information Technology & People*, 28(1). <https://www.emerald.com/insight/content/doi/10.1108/ITP-08-2013-0155/full/html>
- Cunha, L., Silva, D. & Maggioli, S. (2022). Exploring the status of the human operator in Industry 4.0: A systematic review. *Front. Psychol.*, 13. <https://www.frontiersin.org/articles/10.3389/fpsyg.2022.889129/full#B14>
- Da Silva, L. B. P., Soltovski, R., Pontes, J., Treinta, F. T., Leitao, P., Mosconi, E., De Resende, L. M. M., & Yoshino, R. T. (2022). Human resources management 4.0: Literature review and trends. *Computers & Industrial Engineering*, 168. <https://www.sciencedirect.com/science/article/abs/pii/S0360835222001814>
- Deng, K., Mo, Y. & Yang, Y. (2022). From the employee perception view towards the digital transformation. Jönköping University, Jönköping, Sweden. <https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1665031&dswid=-2946>
- Ekhsan, M., Badrianto, Y., & Suwandi, S. (2023). Digital talent on employee retention: The role of employee engagement as mediation. *Journal of Law and Sustainable Development*, 11(10). <https://ojs.journalsdg.org/jlss/article/view/1121>
- Ejmont, K. (2021). The impact of industry 4.0 on employees—insights from Australia. *Sustainability*, 13, 3095. <https://www.mdpi.com/2071-1050/13/6/3095>
- Fregnan, E., Ivaldi, S., & Scaratti, G. (2020). HRM 4.0 and new managerial competences profile: The COMAU case. *Front. Psychol.*, 11, 578251. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7714775/>
- Gomathy, C. K., Kumar, C. N., Kammeshwari, M., & Abhilash, S. (2022). Employee engagement strategies in information technology companies. *International Journal of Scientific Research in Engineering and Management*, 6(3). https://www.researchgate.net/publication/359430514_EMPLOYEE_ENGAGEMENT_STRATEGIES_IN_INFORMATION_TECHNOLOGY_COMPANIES
- Goswami, B. K. & Upadhyay, Y. (2019). An empirical study on digital transformation and its impact on employee engagement. *Proceedings of 10th International Conference on Digital Strategies for Organizational Success*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3320668
- Guerra, J., Danvila-del-Valle, I. & Mendez-Suarez, M. (2023). The impact of digital transformation on talent management. *Technological Forecasting and Social Change*, 188. <https://www.sciencedirect.com/science/article/pii/S0040162522008125>
- Habachi, M., Nouria, Z., Malainine, C., & Hajaji, O. (2022). Impact of digitalization on the attractiveness of employee recruitment and retention in Moroccan companies. *Problems and Perspectives in Management*, 20(3), 12-27. <https://www.businessperspectives.org/index.php/journals/problems-and-perspectives-in-management/issue-412/impact-of-digitalization-on-the-attractiveness-of-employee-recruitment-and-retention-in-moroccan-companies>
- Hamburg, I. (2019). Implementation of a digital workplace strategy to drive behavior change and improve competencies. *Strategy and Behaviors in the Digital Economy*. <https://www.intechopen.com/chapters/66027>
- Harunavamwe, M. & Ward, C. (2022). The influence of technostress, work–family conflict, and perceived organisational support on workplace flourishing amidst COVID-19. *Front. Psychol.*, 13. <https://www.frontiersin.org/articles/10.3389/fpsyg.2022.921211/full>
- Hizam, S. M. , Akter, H., Sentosa, I., Ahmed, W., Masrek, M. N., & Ali, J. (2023). Predicting workforce engagement towards digital transformation through a multi-analytical approach. *Sustainability*, 15, 6835. <https://www.mdpi.com/2071-1050/15/8/6835>
- Ibrahim, M., & Al Falasi, S. (2014). Employee loyalty and engagement in UAE public sector. *Employee Relations*, 36(5), 562-582. <https://www.emerald.com/insight/content/doi/10.1108/ER-07-2013-0098/full/html>
- Imperatori, B., Bissola, R., Butera, F. & Bodega, D. (2019). Work and HRM in the 4.0 era: Insights and research directions. *Studi Organizzativi*, 11(2), 9-26. <http://digital.casalini.it/10.3280/SO2019-002001>
- Inegbedion, H., Inegbedion, E., Peter, A., & Harry, L. (2020). Perception of workload balance and employee job satisfaction in work organisations. *Heliyon*, 6(1), e03160. [https://www.cell.com/heliyon/fulltext/S2405-8440\(20\)30005-0?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS2405844020300050%3Fshowall%3Dtrue](https://www.cell.com/heliyon/fulltext/S2405-8440(20)30005-0?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS2405844020300050%3Fshowall%3Dtrue)
- Kim, K. H. & Chon, M-G. (2022). When work and life boundaries are blurred: The effect of after-hours work communication through communication technology on employee outcomes. *Journal of Communication Management*, 26(4). <https://www.emerald.com/insight/content/doi/10.1108/JCOM-06-2022-0073/full/html>
- Kot, P. (2022). Role of technostress in job satisfaction and work engagement in people working with information and communication technologies. *Pakistan Journal of Psychological Research*, 37(3), 331-349. <https://pjpr.scione.com/cms/abstract.php?id=356>
- Kucharčíková, A., Mičiak, M., Bartošová, A., Budžel'ová, M., Bugajová, S., Maslíková, A., PISOňOVÁ, S. (2021). Human Capital



Management and Industry 4.0. SHS Web of Conferences, 90. <https://ouci.dntb.gov.ua/en/works/7pPk5mx7/>

Lane, J. N., Leonardi, P. M., Contractor, N. S., & DeChurch, L. A. (2024). Teams in the digital workplace: Technology's role for communication, collaboration, and performance. *Small Group Research*, 55(1), 139-183. <https://doi.org/10.1177/10464964231200015>

Lewthwaite, S., Horton, S., & Coverdale, A. (2023). Workplace approaches to teaching digital accessibility: establishing a common foundation of awareness and understanding. *Front. Comput. Sci.*, 5. <https://www.frontiersin.org/journals/computer-science/articles/10.3389/fcomp.2023.1155864/full#B9>

Li, Z., Yang, C., Yang, Z., & Zhao, Y. (2024). The impact of middle managers' digital leadership on employee work engagement. *Front. Psychol.*, 15. <https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1368442/full>

Liboni, L. B., Cezarino, L. O., Jabbour, C. J. C., Oliveira, B. G., & Stefanelli, N. O. (2019). Smart industry and the pathways to HRM 4.0: Implications for SCM. *Supply Chain Management*, 24(1), 124-146. <https://pustaka-sarawak.com/eknowbase/attachments/1585623542.pdf>

Maylett, T., & Wride, M. (2017). *The employee experience: How to attract talent, retain top performers, and drive results*. New Jersey, United States: John Wiley & Sons. https://books.google.com.ph/books?hl=en&lr=&id=q228DQAAQBAJ&oi=fnd&pg=PR9&ots=lcaQavOdao&sig=Q-8gQzU47I9Q_El1Ds3T-6OWcbw&redir_esc=y#v=onepage&q&f=false

Mitchell, R.N. (2015). *The correlation between virtual communication and employee engagement*. Walden University, Minnesota, United States. <https://scholarworks.waldenu.edu/dissertations/497/>

Moganadas, S.R. & Goh, G.G.G. (2022). Digital employee experience constructs and measurement framework: A review and synthesis. *International Journal of Technology*, 13(5), 999-1012. <https://openurl.ebsco.com/EPDB%3Aagd%3A12%3A4828700/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Aagd%3A159767394&crl=c>

Mustafa, A. (2017). Erase the Electronic divide: EPMOs are ideally positioned to help organizations become digital -- and sell digital. *PM Network*, 31(5), 25. <https://www.pmi.org/learning/library/erase-electronic-divide-epmos-help-organizations-become-digital-10757>

Nastjuk, I., Trang, S., Grummeck-Braamt, J.-V., Adam, M.T.P., Tarafdar, M. (2023). Integrating and synthesising technostress research: A meta-analysis on technostress creators, outcomes, and IS usage contexts. *European Journal of Information Systems*, 33(3), 361-382. <https://doi.org/10.1080/0960085X.2022.2154712>

Ooi P. B., Jaafar W. M. W., & Crosling G. (2021). Malaysian school counselor's self-efficacy: The key roles of supervisor support for training, mastery experience, and access to training. *Front. Psychol.* 12, 749225. <https://psycnet.apa.org/record/2022-18442-001>

Philippine Statistics Authority. (2022). Total employed persons and employment rate 2021f and 2022p. Freedom of Information Philippines. <https://psa.gov.ph/system/files/iesd/Table%202.%20Total%20Employed%20Persons%20and%20Employment%20Rate%202021f%20and%202022p.xlsx>

Rafique, M., Asim, M., & Manzoor, S. (2021). Human resource management in industrial revolution 4.0. *Pakistan Social Sciences Review*, 5(1), 564-580. <https://pssr.org.pk/article/human-resource-management-in-industrial-revolution-4-0>

Rassameethes, B., Phusavat, K., Pastuszak, Z., Hidayanto, A. N., & Majava, J. (2021). From training to learning: Transition of a workplace for industry 4.0. *Human Systems Management*, 40(6), 777-787. <https://content.iospress.com/articles/human-systems-management/hsm211533>

Sakarina, S., Ena, Z., Jenita, Cakranegara, P. A., & Surahman, S. (2022). Digital transformation in human resource management in the industrial age 4.0. *Quantitative Economics and Management Studies*, 3(5). <https://qemsjournal.org/index.php/qems/article/view/1067>

Salvadorinho, J., & Teixeira, L. (2023). Happy and engaged workforce in industry 4.0: A new concept of digital tool for HR based on theoretical and practical trends. *Sustainability*, 15, 2781. <https://www.mdpi.com/2071-1050/15/3/2781>

Sathyavathi, V., & Angayarkanni, R. (2020). Impact of employee performance of IT employees in Chennai during covid-19 lockdowns. *International Journal of Pharmaceuticals Sciences Review and Research*, 64(2), 65-69. <https://doi.org/10.47583/ijpsrr.2020.v64i02.011>

Stofberg, L., Koekemoer, E. & Strasheim, A. (2021). Digitalisation in the workplace: The role of technology on employee engagement and creativity teams. *Agile Coping in the Digital Workplace*, 231-257. https://link.springer.com/chapter/10.1007/978-3-030-70228-1_12

Tucker, E. (2020). Driving engagement with the employee experience. *Strategic HR Review*. <https://www.emerald.com/insight/content/doi/10.1108/SHR-03-2020-0023/full/html>



Wang, W., Chen, L., Xiong, M., & Wang, Y. (2021). Accelerating AI adoption with responsible AI signals and employee engagement mechanisms in health care. *Information Systems Frontiers*, 25, 2239-2256. <https://doi.org/10.1007/s10796-021-10154-4>

Yener, S., Arslan, A., & Kiliç, S. (2020). The moderating roles of technological self-efficacy and time management in the technostress and employee performance relationship through burnout. *Information Technology & People*, 34(7). <https://www.emerald.com/insight/content/doi/10.1108/ITP-09-2019-0462/full/html>

Yildiz, D., Temur, G.T., Beskese, A., & Bozbura, F.T. (2020). Evaluation of positive employee experience using hesitant fuzzy analytic hierarchy process. *Journal of Intelligent and Fuzzy Systems*, 38(1), 1043-1058. <https://content.iospress.com/articles/journal-of-intelligent-and-fuzzy-systems/ifs179467>

Zhenjing, G., Chupradit, S., Ku, K., Nassani, A. & Haffar, M. (2022). Impact of employees' workplace environment on employees' performance: A multi-mediation model. *Front Public Health*, 10(890400). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9136218/>

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