The impact of digital transformation on human resource management: Survey evidence in Vietnam

Nguyen Hoang Nam*

College of Economics, Law and Government, University of Economics Ho Chi Minh City,
279 Nguyen Tri Phuong Street, Dien Hong Ward, Ho Chi Minh City, Vietnam

Received 2 May 2024; revised 2 July 2024; accepted 2 October 2024

Abstract:

The digital economy is regarded as a long-term developmental orientation for many countries globally. The Fourth Industrial Revolution has introduced significant changes in the design and operation of human resource management. Vietnam is among the countries with substantial potential in accessing, exploiting, and applying digital transformation within human resources. This research aims to evaluate the impact of digital transformation on human resource management. To analyse this impact, the author assessed the relationship between digital transformation and human resource management factors. The proposed research model includes one dependent variable and three independent variables, referencing previous studies: human resource development, talent management, and work performance. The research method combines qualitative approaches through in-depth discussions with experts and quantitative methods based on multivariate regression analysis. Survey data, including 500 employees and managers in the human resources sector in Vietnam, utilised a 5-level Likert scale. The research results indicate a positive impact of digital transformation on human resource management. Furthermore, the impact on work performance is the strongest, followed by talent management, and finally, human resource development. This research is valuable not only in raising organisational awareness about digital transformation but also in providing a deeper understanding for human resource management policymakers on how to approach digital transformation in organisational operations.

Keywords: **digital transformation, human resource development, human resource management, performance management, talent management, work performance.**

Classification numbers: **2.2, 7**

1. Introduction

In addition to economic, political, and socio-cultural factors, the leadership team, business goals, and level of competition, technological environment factors greatly influence the business situation and growth potential of an organisation [1]. For Vietnam, the trend of economic globalisation has created numerous opportunities to acquire advanced technology and access large markets, while also presenting significant challenges and competitive pressures from abroad that businesses may struggle to overcome without prior preparation [2, 3].

Human resource management is considered a key issue for digital transformation. Following the COVID-19 pandemic, businesses have increased their efforts to enhance the application of digital technology in production and business activities. Currently, the number of businesses in Vietnam applying digital technology to business activities in general, and human resource management in particular, is increasingly improvingremains limited. According to a recent survey by CPA Australia on a group of accounting and finance professionals working in different markets, 74% of Vietnamese enterprises have established a digitalisation strategy as part of their organisational plan, higher than the average of 63% in the Asia-Pacific region [4]. The target set by the Prime Minister aims for Vietnam to develop 100,000 digital technology businesses with 1.5 million workers by 2030.

In a recent report outlining goals for 2025 and a vision for 2030, many provinces and cities, including Ho Chi Minh city, identified the application of digital technology in daily life as a breakthrough to create a favourable and transparent environment for the activities of people and businesses. Typically, the use of document management software and various types of work records on digital platforms is expected to become more prevalent. The application for managing residential areas and work records at the People's Committees of wards (G-office) will be pioneering in handling local administrative work. It is evident that Vietnam's embrace of Industry 4.0 and digital transformation is significantly impacting both the social and economic landscape of the country [5, 6].

*Email: nguyenhoangnam2506@gmail.com

This research aims to provide an objective perspective on the impact of digital transformation on issues related to human resource management. Within the scope of this article, the authors will focus on answering two questions: (1) Does digital transformation impact human resource management? (2) How does digital transformation affect aspects related to human resource management, including human resource development, talent management, and work performance? The study is divided into six parts. The theoretical basis is presented after the introduction. Part 3 builds the model and research hypotheses. Part 4 describes the research data sample collection and analysis process. The research results and discussion are presented in Part 5. Conclusions and policy implications are presented in Part 6, clarifying the role of digital transformation in the development of the country in general and the field of human resource management in particular.

2. Theoretical basis

2.1. Relationship between digital transformation and human resource management

The digital economy represents the process of digital transformation at the national level [7]. Every field, business, individual, and the Government can utilise digital technology to achieve breakthroughs in productivity and outstanding work efficiency [8, 9]. Businesses are increasingly adopting digital-centric models, whether selling digital products and services directly or providing the physical products and infrastructure that support them [10].

Digital transformation extends beyond merely converting to digital businesses; it involves fundamentally changing how a business operates by leveraging digital technology [11]. It is about using technology to improve efficiency, create new value for customers, and gain a competitive advantage [12]. New technology applications, such as artificial intelligence (AI), digital service connection platforms, blockchain, the Internet of Things (IoT), and electronic identity platforms, are used to change work processes, operating methods, and labour culture in businesses [13].

Digital transformation originates from the digitisation of data and processes, equipping organisations with the agility to thrive in an ever-evolving technological environment. It is driven by the need to digitise data and processes, empowering organisations to keep pace with the dynamic technology landscape. Digital transformation is changing the world of work, affecting technology and the relationships between workers, machines, and work organisation [14].

Human resources are the central factor determining the strength, competitiveness, and sustainable development of each country. Globalisation and international integration necessitate a focus on analysing and forecasting human resource needs, along with a thorough understanding of the scale, structure, and quality of the current workforce. Human resources are also central to the organisation, primarily responsible for designing the organisational structure. Human resource management in organisations targets three goals: social goals, organisational goals, and individual goals [15].

Human resource development is a set of systematic and proactive activities aimed at improving the knowledge, skills and capabilities of all employees in an organization. Talent management is an integrated, strategic process to attract, develop, retain and motivate highly capable employees who are considered the organisation's talents. Work performance is the level of work performance of an individual, group or organization, measured against established standards and goals. The three concepts of Human resource development, Talent management and Work performance are closely related and mutually supportive in an organisation's human resource management strategy [16].

Moreover, the growing digital human resources play a key role in the total social labour force. Therefore, developing digital human resources is inevitable in the process of restructuring labour for each country [17]. There is a unity between digital human resources and high-quality human resources in terms of qualifications, skills, qualities, and professional ethical values [18]. Examining the relationship between digital transformation and human resource management, J. Wilcox, et al. (2023) [19] suggest it can be divided into six stages of digital business transformation: (1) Business as Usual, (2) Present and Active, (3) Formalised, (4) Strategic, (5) Converged, and (6) Innovative and Adaptive [19, 20]. To clearly see the impact of digital transformation on human resource management in the past and present, the comparison is shown in Table 1.

Table 1. Digital HR between old rules and new rules.

Old rules	New rules
Human resources departments focus on process design and harmonisation to establish standard human resources practices.	Human resources departments focus on optimising employee productivity, engagement, teamwork, and career growth.
Human resources selects a cloud vendor and implements out-of-the-box practices to achieve scale.	Human resources builds innovative, company-specific programmes, develops apps, and leverages the platform for scale.
Human resources technology teams concentrate on ERP implementation and integrated analytics, emphasising "ease of use".	Human resources technology team moves beyond ERP to develop digital capabilities and mobile apps, focusing on "productivity at work".
Human resources centres of excellence focus on process design and process excellence.	Human resources centres of excellence leverage AI, chat, apps, and other advanced technologies to scale and empower employees.
Human resources programmes are designed for scale and consistency worldwide.	Human resources programmes target employee segments, personae, and specific groups, providing them with journey maps relevant to their jobs and careers.
Human resources focuses on "self-service" as a means to scale services and support.	Human resources focuses on "enablement" to assist individuals in completing work more effectively and productively.
Human resources develops an employee "self-service portal" as a technology platform that facilitates easy access to transactional needs and programmes.	Human Resources builds an integrated "employee experience platform using digital apps, case management, AI, and bots to support ongoing employee needs.

Source: Deloitte University Press [21].

2.2. The impact of digital transformation on human resource management

The impact of digital transformation on human resource development: Training and development are among the innovative methods through which digitalisation introduces a new phase of transformation [22]. Corporate human resources departments face challenges in developing HR practices that ensure a balance between work and increasingly positive emotional, cognitive, and behavioural life experiences. Therefore, it is necessary to consider designing new strategies to develop human resource development systems in the future [23]. Simultaneously, investing in human resource development is a critical factor for businesses to successfully transition into digital operations [24]. To thrive in the digital age, businesses need to prioritise human resource development programmes that equip employees with the necessary digital skills. Alongside technological advancements, successful digital transformation hinges on effective human resource development that fosters a culture of digital adoption within the workforce.

H_1: Digital transformation has a positive impact on human resource development.

The impact of digital transformation on talent management: Issues related to talent management must focus on human resource training [25]. Today, the digital workforce needs to be equipped with specialised knowledge and skills in digital technology [26]. Many human resource management professionals are beginning to innovate and redesign digitalised work methods and organisational structures. Digitalisation has also allowed tasks to be organised differently, as information is no longer tied to paperwork or physical locations, thus facilitating and organising work, and most importantly, focusing on improving efficiency [27]. Additionally, we face challenges and need to implement solutions focusing on skills training, updating technology, and changing employment policies to encourage labour and utilise talented individuals [28]. Effective training goes beyond skill development. It fuels employee motivation and fosters a culture of innovation, critical for success in the digital transformation era. By effectively implementing training, organisations empower employees with new skills and knowledge, boosting their motivation to contribute meaningfully to digital transformation efforts. Well-implemented training programmes equip employees with the skills and experience needed to not only contribute but also thrive during digital transformation [29].

In Vietnam, the shortage of skilled staff at all levels, especially the management and professional levels, has been a limitation. In the recent assessment report of the General Statistics Office of Vietnam (GSO) on Vietnam's labour market in 2023, it is estimated that the proportion of trained workers with degrees and certificates in 2023 is 27.0%, an increase of 0.6 percentage points compared to the previous year. However, there is still a significant lack of qualified staff, especially digital human resources [30]. For example, Vietnam currently has about 30 operating companies with more than 5,000 semiconductor engineers but may need up to 20,000 people in the next five years and 50,000 in the next ten years [31].

H_2: Digital transformation has a positive impact on talent management.

The impact of digital transformation on work performance: Leveraging technology is an inevitable strategy to ensure a balance between embracing innovation and work performance in any organisation [32]. Technology plays a crucial role in enabling organisations to strike a balance between embracing innovation and optimising work performance. In today's competitive landscape, applying digital technology strategically is key to driving innovation and maintaining good performance [33]. The advancement of technology in the global workplace is now having a profound impact on the role of human resources management.

On the other hand, digital transformation completely changes the way businesses operate, improving work performance and bringing value to customers [34]. By embracing digital transformation, businesses can achieve standardised operations across all departments. This standardisation fosters sustainability, productivity, efficiency, and security, ultimately leading to a significant boost in work performance [35, 36].

H_3: Digital transformation has a positive impact on work performance.

3. Research model and hypothesis

Based on N.K. Betchoo's previous research (2016) [37], the author established a research model for the topic of assessing the impact of digital transformation on human resource management in Vietnam. Specifically, the research model is as shown below (Fig. 1):

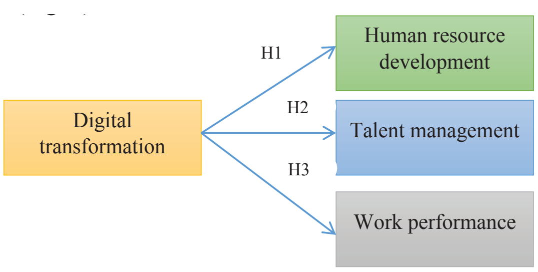

Fig. 1. Research model. Source: Author's research model.

Three research questions were posed in this study:

Research question 1: How does digital transformation affect human resource development?

Research question 2: How does digital transformation affect talent management?

Research question 3: How does digital transformation affect work performance?

Based on the proposed research model, the author sets out three research hypotheses:

H_1: Digital transformation has a positive impact on human resource development.

H_2: Digital transformation has a positive impact on talent management.

H_3: Digital transformation has a positive impact on work performance.

4. Research methods

4.1. Research data

Qualitative research involves constructing mock models, developing figures, and adjusting scales. The research was conducted using the group discussion method by soliciting the opinions of 10 experts in Vietnam, including 3 human resource directors and 7 human resource department heads within the company. The discussions were conducted through face-to-face interviews in March 2024. Specifically:

Step 1: The author conducts a discussion with expert group. This group discussion utilises a table model summarising related research. To consider and evaluate the impact of digital transformation on human resource management, the author selected a proposed scale including three variables: (1) human resource development, (2) talent management, and (3) work performance.

Step 2: The author provides an in-depth interview table with the measurement scales of the variables to determine the observed variables and select them for inclusion in the official survey questionnaire. Then, the expert group answered the questions in the interview panel and selected appropriate scales. The independent variables after conducting the second survey are as follows: Human resource development includes 4 observed variables; Talent management includes 4 observed variables; Work performance includes 4 observed variables.

From the qualitative research results combined with the theoretical basis, the author calibrated the scale and coded the research factors as follows: Human resource development: HD; Talent management: TM; Work performance: WP; Digital transformation: DT.

4.2. Research scale

The study's scale was inherited and developed from the original scale of N.K. Betchoo (2016) [37]. The author conducted in-depth interviews with expert group in the human resources industry and adjusted it to suit the research model of the observed variables at the following calibration scale table (Table 2).

Table 2. Research scale of observed variables.

	Original observed variable	Adjusted observed variable	Encode
Human resource development	Digital revolution develops my ICT knowledge at work.	Digital transformation helps develop my information and communication technology knowledge at work.	HD1
	Digital revolution develops my cognitive skills at work.	Digital transformation helps develop my cognitive skills at work.	HD2
	Digital revolution assists me in continuous professional development.	Digital transformation supports my continuous professional development.	HD3
	Digital revolution enhances my career advancement at work.	Digital transformation helps improve my career advancement at work.	HD4
Talent management	Digital revolution makes me creative at work.	Digital transformation helps me be creative at work.	TM1
	Digital revolution broadens my talent at work.	Digital transformation helps expand my talents at work.	TM2
	Digital revolution brings change and transformation in me compared to the past.	Digital transformation brings a change in me compared to the past.	TM3
	Digital revolution qualifies me for a higher position at work.	Digital transformation helps me get a higher position at work.	TM4
Work performance	Digital revolution improves my productivity at work.	Digital transformation helps improve my productivity at work.	WP1
	Digital revolution enhances my customer service at work.	Digital transformation enhances my customer service at work.	WP2
	Digital revolution adds value to the work that I handle.	Digital transformation adds value to the work I do.	WP3
	Digital revolution enhances my responsiveness and adaptation to flexible and productive work.	Digital transformation helps improve my ability to respond and adapt at work.	WP4

Source: Author's research scale.

In addition, when conducting in-depth interviews with expert group in the human resources industry, the author also synthesised opinions to establish a scale for the observed variable "Digital transformation", as follows (Table 3):

Table 3. Research scale of observed variable "Digital transformation".

	Observed variables	Encode
Digital transformation	I plan to apply digital transformation to solve tasks in the near future.	DT1
	I predict human resource management will apply digital transformation in the coming future.	DT2
	My use of digital transformation will most likely happen soon.	DT3

Source: Author's compilation.

The research questionnaire utilised a 5-level Likert scale: 1: Strongly disagree; 2: Disagree; 3: Neutral; 4: Agree; 5: Totally agree. The scale includes 12 observed variables for 3 quality components, which form an independent variable scale comprising human resource development: 4 variables; talent management: 4 variables; work performance: 4 variables, and 1 dependent variable scale for digital transformation: 3 variables.

4.3. Research methods

Data processing method: After adjusting to complete and obtain the official scale, the author proceeds to collect research data. Out of a total of 545 surveys collected through the software, the author counted a survey sample of 500 as suitable for the study (Table 4).

Table 4. Detailed response data.

	Original survey number	Number of records returned after survey	The number of infringing copies is excluded	Number of copies used for final statistics
Total	545	543	43	500

Source: Author's calculations.

Data used in the study was collected with a sample size of 500 through a direct survey questionnaire combined with Google forms software. Details of survey data are in Table 5 below.

Table 5. Description of sample.

Description	Number	Percentage (%)
Gender		
Male	208	41.6
Female	292	58.4
Age		
18-24	31	6.2
25-29	164	32.8
30-40	283	56.6
Over 40	22	4.4
Position in company		
Employees	383	76.6
Managers	117	23.4
The company apply digital transformation in human resource management activities		
Yes	326	65.2
No	174	34.8
Is the company you work for applying digital transformation in human resource management activities?		
Yes	326	65.2
No	174	34.8

Source: Author's calculations.

Based on the research data collected, the author exported the results file from Google Forms software for synthesis and processing using Microsoft Excel 2010. After obtaining complete data, the author conducted descriptive statistics through SPSS 23 software. Additionally, the study analysed the reliability coefficient using Cronbach's alpha, EFA exploratory factor analysis, and Pearson correlation analysis.

Verification methods: The author tests the suitability of the regression model through ANOVA analysis of variance (if Sig.>0.05, there is no difference in variance; conversely, if Sig.<0.05, there is a difference in variance) [38]. The study also tests for multicollinearity (correlation between independent variables) using the tolerance value or the variance inflation factor (VIF). If VIF>10, it indicates a multicollinearity phenomenon [39]. Additionally, the study employs the Durbin-Watson test to assess autocorrelation in the model's residuals. This test statistic ranges from 0 to 4. Ideally, a value close to 2 (typically between 1 and 3) suggests no significant autocorrelation. Values closer to 0 indicate positive autocorrelation, while values exceeding 3 suggest negative autocorrelation [40]. Finally, the author conducted T-test and ANOVA to test the difference in the level of influence of factors affecting human resource management according to demographic variables. Through testing, the author will determine the difference in variance, the presence of multicollinearity, and conduct multiple regression analysis to evaluate the appropriateness of the research model. When determining the level of influence of factors, those with larger beta coefficients are considered to have a higher level of influence than other factors in the research model.

5. Research results

5.1. Cronbach's alpha reliability test

After applying the SPSS processing scales and testing Cronbach's alpha, the processing results are given in Table 6.

Table 6. Summary of scale reliability analysis results.

Factor	Number of initial observed variables	Number of remaining observed variables	Cronbach's alpha
Human resource development	4	4	0.810
Talent management	4	4	0.839
Work performance	4	4	0.940
Digital transformation	3	3	0.930
Total	15	15	

Source: Author's calculations.

The scales used in the research model all have reliability greater than 0.6, indicating that all observed variables are eligible for use in the analysis step. All observed variables show that the total correlation coefficient is greater than 0.3. Exploratory factor analysis results indicate that the KMO coefficient is ≥0.5 and the significance level of the Bartlett test is ≤0.05. After evaluating the reliability of the scale using Cronbach's alpha coefficient, the total number of variables included in the final analysis was 15.

5.2. Pearson correlation analysis

The hypothesis H0 of this test assumes that there is no correlation between the two variables (i.e., the coefficients are not statistically significant). We will consider, with 99% confidence, whether the P-value (Sig. level of significance) is<0.05. If Sig.<0.05, then we have sufficient basis to reject the hypothesis H0, indicating that the correlation coefficient between the two variables is significant. Conversely, if Sig.>0.05, we accept the hypothesis H0, meaning the linear correlation coefficient between the two variables is not meaningful. The Pearson correlation coefficient matrix is analysed to examine the correlation between variables [41]. The results are shown in Table 7.

Table 7. Pearson correlation between research variables.

		HD	TM	WP	DT
HD	Pearson correlation	1			
	Sig. (2-tailed)				
TM	Pearson correlation	0.641**	1		
	Sig. (2-tailed)	0.000			
WP	Pearson correlation	0.558**	0.552**	1	
	Sig. (2-tailed)	0.000	0.000		
DT	Pearson correlation	0.504**	0.599**	0.808**	1
	Sig. (2-tailed)	0.000	0.000	0.000	

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

Source: Author's calculations.

Based on Table 7, which shows the correlation between variables, the results from the Pearson correlation test indicate that the level of correlation between the variable DT and the variables HD, TM, and WP has a Sig.<0.05, specifically 0.000. Additionally, there is a positive correlation between the variable DT and the variables in the model: HD, TM, and WP. The average correlation coefficients between these variables are 0.504, 0.599, and 0.808, respectively.

5.3. Multiple regression analysis

The Durbin-Watson test coefficients for the tests all yield results in the range 1<d<3, indicating that the model hypothesis of no autocorrelation is accepted [40]. Additionally, for the multiple regression model to be considered an overall model, it is necessary to examine the F-test in the ANOVA analysis. Testing the F statistic value, with Sig.=0.000<0.05 from the ANOVA analysis, shows that the constructed multiple linear regression model is suitable for the data set and can be used [38]. The model has F-test values for HD, TM, and WP margins of 67.454, 111.019, and 372.152, respectively, with all Sig.=0.000<0.05, thus rejecting the hypothesis H0 that the overall coefficient of determination R-square=0 [42]. The multiple regression model is suitable for the data set and can be used.

The regression results in Table 8 show that the significance levels corresponding to the variables HD, TM, and WP are less than 0.05. Therefore, with a significance level of 5%, it can be concluded that the variable DT has an impact on the variables HD, TM, and WP. The study did not exhibit multicollinearity, as the VIF of all tests was less than 2 [39].

Table 8. Regression results.

Model	Unstandardised coefficients		Standardised coefficients	t	Sig.	Durbin-Watson	F-test
	B	*Std. Error*	*Beta*				
HD	0.509	0.062	0.504	8.213	0.000	1.975	67.454
TM	0.724	0.069	0.599	10.537	0.000	1.839	111.019
WP	0.792	0.041	0.808	19.291	0.000	1.966	372.152

Source: Author's calculations.

Testing for differences by demographic composition: Considering Leneve's test, ANOVA (sig.>0.05) or Welch's test (sig.<0.05) of demographic components, including: gender, age, job position and digital transformation application at the company, the results showed that there was no difference between the groups at the 5% statistical significance level. Therefore, the author determined that there was no impact on the dependent variable.

5.4. Discussion of results

Through the regression results, the research presents the following hypothesis testing results as shown in Table 9.

Table 9. Results of testing research hypotheses.

Symbol	Hypothesis	Result
H_1	Digital transformation has a positive impact on human resource development.	Accept
H_2	Digital transformation has a positive impact on talent management.	Accept
H_3	Digital transformation has a positive impact on work performance.	Accept

Source: Author's statistics.

Thereby, the study found answers to two questions. First, digital transformation has a significant impact on human resource management, and the results show that this relationship is statistically significant. Second, digital transformation positively impacts human resource management, specifically in human resource development, talent management, and work performance. The level of impact of digital transformation on these factors is arranged in the following order:

- Work performance factor with a standardised coefficient β=0.808. The standardised beta coefficient of the work performance factor has a positive sign, reflecting the positive relationship between digital transformation and work performance in human resource management.

- Talent management factor with a standardised coefficient β=0.599. The standardised beta coefficient of the talent management factor has a positive sign, reflecting the positive relationship between digital transformation and talent management in human resource management.

- Human resource development factor with a standardised coefficient β=0.504. The standardised beta coefficient of the human resource development factor has a positive sign, reflecting the positive relationship between digital transformation and human resource development in human resource management.

Although there are differences in research space and time, the research results align with previous studies by N.K. Betchoo (2016) [37], which found that digital transformation positively impacts human resource management. In particular, issues related to human resource management, such as human resource development, talent management, and work performance, need to be implemented appropriately to improve the organisation's work efficiency.

6. Conclusions and policy implications

The research objective is to evaluate the impact of digital transformation on human resource management. The author analyses and evaluates the relationship between digital transformation and human resource management factors, including human resource development, talent management, and work performance. By combining qualitative research methods through in-depth discussions with experts and quantitative research methods based on multivariate regression analysis, the research shows a positive impact between digital transformation and human resource management. Additionally, the impact of digital transformation on work performance is the strongest, followed by talent management and finally human resource development.

First, for each locality, raising awareness about digital transformation is extremely necessary. Reality shows that the application of digital transformation in human resource management in Vietnam is still not consistent across localities. In big cities like Hanoi, Da Nang, and Ho Chi Minh city, raising awareness about technology applications, specifically digital transformation applications in work, is essential to be more proactive and access technology faster, thereby increasing efficiency and value at work. In remote areas, traditional human resource management is still heavily formalised, not focusing on work performance; at the same time, digital transformation is a relatively new method in these localities. Therefore, agencies and local governments need to have policies to encourage individuals and businesses to apply digital transformation in human resource management in the coming time. To do this in a long-term and sustainable way, it is necessary to raise awareness of individuals and businesses about digital transformation, helping them see the benefits that digital transformation brings, such as improving work performance, managing and retaining talent, or consolidating and developing future human resources.

Second, in the context of the rapid industrial revolution 4.0, human resources in Vietnam must constantly learn and hone knowledge and skills, especially digital technology. For digital transformation to bring value in human resource management, it is necessary to have people who are knowledgeable and have strong knowledge of applying technology to work. The role of universities in particular and educational agencies in Vietnam in general is extremely important. Equipping students and learners with knowledge, skills, and attitudes in digital transformation is something that needs to be improved in the near future. Therefore, schools need to change their approach and apply more technology in teaching so that learners gradually get used to applying digital technology in life and work.

Third, there needs to be motivation from the government in applying digital transformation to the economy in general and human resource management in particular. In addition to encouraging businesses to apply digital transformation, recently, Decision No.749/QD-TTg dated June 3, 2020, of the Prime Minister on relevant agencies and branches to consider and decide on the issue of research and development of a Project on training and developing human resources for digital transformation in Vietnam until 2025, with an orientation to 2030, ensuring compliance with the tasks and solutions set out in many policies in Vietnam's vision of innovating digital human resource management in the coming time [43]. At the same time, human resource managers must understand and apply digital technology application systems to ensure effective management of digital transformation in business. In other words, there must be effective synergy between the deployment and use of digital technologies to exploit the benefits in human resource management. Therefore, for agencies and departments, policies in the coming time need to have more support for businesses, specifically through training and guidance. For human resource managers in each business, clear processes and mechanisms should be established in digital transformation based on three aspects: work performance, talent management, and human resource development.

The study still has some limitations. First, the sample data were collected conveniently without distinguishing between employees, specialists, or managers working in the human resources field, which to some extent may lead to differences. Second, although empirical evidence shows that the research model can explain and provide interesting insights into the impact of digital transformation on human resource management in Vietnam, the results do not fully explain the impact of digital transformation on human resource management. Specifically, the study only examined the impact of digital transformation on three factors: human resource development, talent management, and work performance. In reality, there are many impacts that digital transformation brings to the field of human resources in general and human resource management in particular, such as the impact of digital transformation on employee training through online learning (E-learning) or how digital transformation affects employee motivation, which have not been mentioned in this study. Therefore, future research can consider implementing or expanding variables to make the research topic more comprehensive.

COMPETING INTERESTS

The author declares that there is no conflict of interest regarding the publication of this article.

REFERENCES

[1] C.J. Chen, C.C. Chang, S.W. Hung (2011), "Influences of technological attributes and environmental factors on technology commercialization", *Journal of Business Ethics*, **104**, pp.525-535, DOI: 10.1007/s10551-011-0926-6.

[2] T.T. Le, N.Q. Huan, T.T.T. Hong, et al. (2021), "Determinants for competitiveness in the context of international integration pressure: Case of small and medium enterprises in emerging economy - Vietnam", *Cogent Business & Management*, **8(1)**, DOI: 10.1080/23311975.2021.1893246.

[3] M.T.T. Thai, L.C. Chong (2008), "Born-global: The case of four Vietnamese SMEs", *Journal of International Entrepreneurship*, **6**, pp.72-100, DOI: 10.1007/s10843-008-0021-y.

[4] CPA Australia (2024), "Technology adoption high amongst Vietnamese businesses", https://www.cpaaustralia.com.au/about-cpa-australia/media/media-releases/technology-adoption-high-amongst-vietnamese-businesses, accessed 28 August 2025.

[5] D.P. Nguyen, X.V.Vo, V.C. Nguyen, et al. (2021), *Sustainable Development for Vietnam's Economy in the Context of Globalization and Industrial Revolution 4.0*, Sustainability and Environmental Decision Making, pp.281-310, DOI: 10.1007/978-981-15-9287-4_15.

[6] H.T. Vo, P.V. Nguyen, S.T.N. Nguyen, et al. (2024), "Unlocking digital transformation in industry 4.0: Exploring organizational readiness, innovation and firm performance in Vietnam", *European Journal of Innovation Management*, DOI: 10.1108/EJIM-03-2024-0273.

[7] E. Brynjolfsson, S. Yang (1996), "Information technology and productivity: A review of the literature", *Advances in Computers*, **43**, pp.179-214, DOI: 10.1016/S0065-2458(08)60644-0.

[8] A. Haleem, M. Javaid, R.P. Singh, et al. (2023), "Management 4.0: Concept, applications and advancements", *Sustainable Operations and Computers*, **4**, pp.10-21, DOI: 10.1016/j.susoc.2022.10.002.

[9] P.S. Aithal (2023), "How to create business value through technological innovations using ICCT underlying technologies", *International Journal of Applied Engineering and Management Letters (IJAEML)*, **7(2)**, pp.232-292.

[10] Z. Li, W. Xie, Z. Wang, et al. (2023), "Antecedent configurations and performance of business models of intelligent manufacturing enterprises", *Technological Forecasting and Social Change*, **193**, DOI: 10.1016/j.techfore.2023.122550.

[11] A. Caliskan, Y.D.O. Özen, Y. Ozturkoglu (2021), "Digital transformation of traditional marketing business model in new industry era", *Journal of Enterprise Information Management*, **34(4)**, pp.1252-1273, DOI: 10.1108/JEIM-02-2020-0084.

[12] S. Bresciani, K. Huarng, A. Malhotra, et al. (2021), "Digital transformation as a springboard for product, process and business model innovation", *Journal of Business Research*, **128**, pp.204-210, DOI: 10.1016/j.jbusres.2021.02.003.

[13] S. Vaska, M. Massaro, E.M. Bagarotto, et al. (2021), "The digital transformation of business model innovation: A structured literature review", *Frontiers in Psychology*, **11**, DOI: 10.3389/fpsyg.2020.539363.

[14] J. Baptista, M.K. Stein, S. Klein, et al. (2020), "Digital work and organisational transformation: Emergent digital/human work configurations in modern organisations", *The Journal of Strategic Information Systems*, **29(2)**, DOI: 10.1016/j.jsis.2020.101618.

[15] N.T. Huong (2020), "Factors affecting human resource management in businesses", *Review of Finance*, **726**, pp.82-84 (in Vietnamese).

[16] D.R. Adhikari (2010), "Human resource development (HRD) for performance management: The case of Nepalese organizations", *International Journal of Productivity and Performance Management*, **59(4)**, pp.306-324, DOI: 10.1108/17410401011038883.

[17] N.M. Tri, V.V. Thanh (2022), "Developing high-quality human resources to fulfill the aspirations of building a prosperous and happy country: problems and solutions", *Quality - Access to Success*, **23(191)**, DOI: 10.47750/QAS/23.191.26.

[18] N.T. Hang (2021), "Universal education development to enhance the quality of human resources in the context of digital transformation and industrial revolution 4.0", *The USV Annals of Economics and Public Administration*, **1(33)**, pp.88-95.

[19] J. Wilcox, M. Bugni (2023), "The six stages of digital transformation and practical steps to get started in your organisation", *Journal of Supply Chain Management, Logistics and Procurement*, **6(2)**, pp.140-154.

[20] P.G. Nikola, I. Roumiana (2022), *Impact of Digital Transformation on the Development of New Business Models and Consumer Experience*, Business Science Reference, 372pp, DOI: 10.4018/978-1-7998-9179-6.ch001.

[21] O. Pascal, S. Michael, W. Brett (2017), "Digital HR: Platforms, people, and work - 2017 global human capital trends", *Deloitte University Press*, https://www2.deloitte.com/us/en/insights/focus/human-capital-trends/2017/digital-transformation-in-hr.html, accessed 25 March 2024.

[22] A. Lumi (2020), "The impact of digitalisation on human resources development", *Prizren Social Science Journal*, **3**, pp.39-46.

[23] N.T.N. Diep, T.T.T. Stephen, H. Marcus (2017), "Development of human resource management in Vietnam: A semantic analysis", *Asia Pacific Journal of Management*, **35**, pp.241-284, DOI: 10.1007/s10490-017-9522-3.

[24] S. Strohmeier (2020), "Digital human resource management: A conceptual clarification", *German Journal of Human Resource Management: Zeitschrift für Personalforschung*, **34(3)**, pp.345-365, DOI: 10.1177/2397002220921131.

[25] A. Colbert, N. Yee, G. George (2016), "The digital workforce and the workplace of the future", *Academy of Management Journal*, **59(3)**, pp.731-739, DOI: 10.5465/amj.2016.4003.

[26] L. Mei, X. Feng, F. Cavallaro (2023), "Evaluate and identify the competencies of the future workforce for digital technologies implementation in higher education", *Journal of Innovation & Knowledge*, **8(4)**, DOI: 10.1016/j.jik.2023.100445.

[27] A.M. Saks (2022), "Caring human resources management and employee engagement", *Human Resource Management Review*, **32(3)**, DOI: 10.1016/j.hrmr.2021.100835.

[28] C.W. Su, X. Yuan, M. Umar, et al. (2022), "Does technological innovation bring destruction or creation to the labor market?" *Technology in Society*, **68**, DOI: 10.1016/j.techsoc.2022.101905.

[29] N. Kashif, I.W. Sut, Z. Stefano, et al. (2024), "Digital transformation and industry 4.0 employees: Empirical evidence from top digital nations", *Technology in Society*, **76**, DOI: 10.1016/j.techsoc.2023.102434.

[30] General Statistics Office (2024), "Vietnam labor market situation in 2023", https://www.gso.gov.vn/du-lieu-va-so-lieu-thong-ke/2024/01/tinh-hinh-thi-truong-lao-dong-viet-nam-nam-2023/, accessed 12 July 2024 (in Vietnamese).

[31] K. Freeman (2024), "Vietnam's semiconductor challenge and the potential within", https://vir.com.vn/vietnams-semiconductor-challenge-and-the-potential-within-108936.html, accessed 12 July 2024.

[32] C.A. Groenewald, E. Groenewald, F. Uy, et al. (2024), "Adapting HRM practices to globalization: Strategies for success in a borderless economy", *International Multidisciplinary Journal of Research for Innovation, Sustainability, and Excellence (IMJRISE)*, **1(3)**, pp.142-149.

[33] C. Cennamo, G.B. Dagnino, A. Minin, et al. (2020), "Managing digital transformation: Scope of transformation and modalities of value co-generation and delivery", *California Management Review*, **62(4)**, pp.5-16, DOI: 10.1177/0008125620942136.

[34] M. Matarazzo, L. Penco, G. Profumo, et al. (2021), "Digital transformation and customer value creation in Made in Italy SMEs: A dynamic capabilities perspective", *Journal of Business Research*, **123**, pp.642-656, DOI: 10.1016/j.jbusres.2020.10.033.

[35] T. Saarikko, U.H. Westergren, T. Blomquist (2020), "Digital transformation: Five recommendations for the digitally conscious firm", *Business Horizons*, **63(6)**, pp.825-839, DOI: 10.1016/j.bushor.2020.07.005.

[36] J. Butt (2020), "A conceptual framework to support digital transformation in manufacturing using an integrated business process management approach", *Designs*, **4(3)**, DOI: 10.3390/designs4030017.

[37] N.K. Betchoo (2016), "Digital transformation and its impact on human resource management: A case analysis of two unrelated businesses in the Mauritian public service", *2016 IEEE International Conference on Emerging Technologies and Innovative Business Practices for the Transformation of Societies (EmergiTech)*, pp.147-152, DOI: 10.1109/EmergiTech.2016.7737328.

[38] T.J. Quirk (2012), *Chapter 9: One-Way Analysis of Variance (ANOVA), Excel 2007 for Educational and Psychological Statistics*, Springer, 238pp, DOI: 10.1007/978-1-4614-3725-3_8.

[39] J.I. Daoud (2017), "Multicollinearity and regression analysis", *Journal of Physics: Conference Series*, **949**, DOI: 10.1088/1742-6596/949/1/012009.

[40] H.D. Vinod (1973), "Generalization of the durbin-watson statistic for higher order autoregressive processes", *Communications in Statistics*, **2(2)**, pp.115-144, DOI: 10.1080/03610927308827060.

[41] T.J. Cleophas, A.H. Zwinderman (2018), *Chapter 11: Bayesian Pearson Correlation Analysis, Modern Bayesian Statistics in Clinical Research*, Springer, 188pp, DOI: 10.1007/978-3-319-92747-3_11.

[42] V.R. Konasani, S. Kadre (2015), *Chapter 10: Multiple Regression Analysis, Practical Business Analytics Using SAS*, Apress Berkeley, 580pp, DOI: 10.1007/978-1-4842-0043-8_10.

[43] The Prime Minister (2020), *Decision No.749/QD-TTg dated June 3, 2020 on Approving The National Digital Transformation Program Through 2025, with Orientations Toward 2030* (in Vietnamese).