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DIGITAL TRANSFORMATION ADOPTION AND ITS INFLUENCE ON PERFORMANCE: AN EMPIRICAL STUDY OF CREATIVE COMPANIES IN VIETNAM

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Abstract. The purpose of the study clarifies the digital transformation adoption and how it impacts on the performance of creative companies in Vietnam. This investigation applied the technology–organization–environment framework and the structural equation modeling approach. The data was collected from 674 survey participants who are middle and senior managers or owners of creative companies in Vietnam, mainly located in Hanoi and Ho Chi Minh City. The structural equation modeling analysis indicates a positive relationship between technological, organizational, and environmental factors, and digital transformation adoption; the digital transformation adoption positively affects a company performance. These findings substantially contribute to the knowledge of digital technologies, digital transformation, company performance, and creative industries in the context of technology, organization, and environment. This research also provides insights for policymakers, readers, scientific communities, and management levels of creative industries to understand more about the environment of Vietnam's creative industries.

Keywords: company performance, creative companies, creative industry, digital transformation, Fourth Industrial Revolution, structural equation modeling, technology–organization–environment framework.

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1. Introduction

Creative industries are the term used for the fields where goods and services are based on periods of creation, production, and distribution originating from the input of creative and intellectual capital (United Nations, 2008). This term can also be understood as creativity, skill, and talent-based activities that generate and use intellectual property to produce income and jobs (Slach et al., 2013). Similarly, the *Economist Intelligence Unit* (2021) also refers to creative industries as essential job generators, creativity and innovation drivers. Creative industries are pioneering and helping to promote brands and exploit markets for other industries. They focus on critical fields with high competitiveness and dynamics and advance the direction of diversifying and linking multidisciplinary. The trend involves regions and countries worldwide to develop creative industries that occur more deeply through investment and trade; as a result, many opportunities to expand creative industries are based on national and international combinations.

Creative industries play a crucial role in economic growth, and macro-economic results are affected by them, that is, the gross domestic product (GDP) index, employment,

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unemployment, interest rates, and related welfare programs (Martinaitytė & Kregždaitė, 2015). Similarly, innovative industries accelerate socio-economic progress, break new theoretical ground, and inspire enterprises to adapt to a fast-changing, technologically driven world (Fleischmann et al., 2017). Fahmi et al. (2016) also argue that an explanatory perspective for human capital, especially the younger, more educated generation, is vital to Indonesia's creative sector clusters. From a recent comprehensive study of digital creative industries' innovation and diversity, Snowball et al. (2021) conclude that advanced digital technologies offer creative industries new prospects for innovation and development. In this era, creativity is considered a critical factor in the knowledge economy; thus, it contributes to competitive advantages for businesses and countries and increases tangible products and intangible services. The products and services of each creative industry field are also protected by copyright law and have their characteristics. Creative industries have a variety of fields; consequently, United Nations (2008) divide them into different disciplines: design, creative services, new media, audiovisuals, performing arts, traditional cultural expressions, cultural sites, visual arts, publishing, and printed media.

Furthermore, digital transformation based on information and communications technology (ICT) infrastructure improves competitiveness and company performance by improving business models, introducing modern technologies, processes, products, and services (Goerzig & Bauernhansl, 2018). Creative products have been transformed by digitization, including music, movies and videos, publishing, video games, and television (Mangematin et al., 2014). United Nations Conference on Trade and Development [UNCTAD] (2018) also mentions an ongoing trend of digital technologies applied to creative industries, including artificial intelligence, big data capture and analytics, blockchain, augmented reality, virtual reality, digital marketing and advertising online. Previous practical studies have applied the technology–organization–environment (TOE) framework (Tornatzky & Fleischer, 1990) and the technology acceptance model (TAM) (Davis, 1989) to examine technological adoption in various industries, for instance, the adoption of augmented reality for electronic commerce (Chandra & Nanda Kumar, 2018), the impact of organizational adoption of social networks in hospital industry (Pateli et al., 2020) and the adoption of cloud computing in small and medium-sized enterprises (SMEs) (Ahmed, 2020). Digital transformation has also been studied to improve company performance, such as the limitation of broadcast coverage and the improvement of business models in the digital television industry (Kaltum et al., 2016), the effectiveness of social networks and websites for the company brand (Jones et al., 2015), and the case study of digital 3D technology in the fashion industry (Arribas & Alfaro, 2018). Another critical study by Hung (2016) clarifies the development of publishing from 1945 and the relationship between the book publishing industry and the television and radio media in Vietnam.

In sum, digital transformation has recently become the best-known issue; however, a complex and consistent empirical study of digital transformation's effects on creative companies' performance is still missing. This paper aims to broaden the knowledge of digital transformation in creative industries in the context of a developing country, the case of Vietnam. Vietnam is a country with a great potential to become a developed creative industry economy in Southeast Asia, and creative industries will be one of Vietnam's principal assets and strengths in the future. Furthermore, Vietnam has a large domestic market, a young

population with a good level of digital technology, cultural diversity, and many supporting industries for creative industries, such as high-level manufacturing industries and information technology. They are a vital foundation for developing creative industries with a central role in the national economy. The findings are expected to identify determinants of digital transformation adoption that affect the performance of creative companies. Therefore, this paper uses the TOE framework proposed by Tornatzky and Fleischer (1990) to conduct a study on the digital transformation adoption and the performance of creative companies in Vietnam.

The rest of this paper is divided into the following parts: Chapter 2 reviews the theoretical background and proposes research hypotheses; Chapter 3 is concerned with methodology; Chapter 4 analyzes the study results; the last part discusses the results and concludes the study.

2. Theoretical background and research hypotheses

Fourth Industrial Revolution (4IR) has changed the production methods for industries in the 21st century and brought many opportunities for developing the digital economy with intelligent products and services. ICT is a significant foundation for digital transformation, an essential reform that improves companies' competitive advantages and performance through business models, modern technologies, processes, products, and services (Goerzig & Bauernhansl, 2018). 4IR is based on advanced technological models such as cyber-physical systems, big data capture and analytics, the Internet of things, cloud computing, artificial intelligence, robotics, blockchain, augmented reality, 3D printing, learning machines, and human–computer interaction (Oztemel & Gursev, 2020; Aceto et al., 2019; Haseeb et al., 2019; Schumacher et al., 2016). UNCTAD (2018) mainly refers to digital technologies for creative industries, including artificial intelligence, big data capture and analytics, blockchain, augmented reality, virtual reality, digital marketing and advertising online.

The highlight of Vietnam's development of the creative industries, in addition, must refer to the country's *Đổi Mới* (renovation or innovation) foreign policy in 1986 (Were, 2019; van Dong & Truong, 2020; Path, 2020). During 35 years of Vietnam's *Đổi Mới* policy, it has helped developing countries like Vietnam improve many socio-economic aspects, people's living standards have been increasingly improved, and the economy is deeply integrated into the world economy. However, the country still faces many difficulties and challenges. Only few previous studies focus on the creative economy and creative industries through various research methodologies, which results in little statistical data on this issue. The study by van Dong and Truong (2020) indicates that Vietnam's creative products exports in the GDP share only reached 3.21% in 2002 and 5.01% in 2015. The rate of value added in creative industries contributed to Vietnam's GDP was 0.64% in 2007, 1.25% in 2012, and 1.51% in 2016 (Hoa, 2018; Ngo et al., 2019).

Hung (2016) studied the character of the book publishing industry associated with radio media and television in Vietnam, as well as the reading culture of printed books and electronic books. Furthermore, the research by Anh Thu et al. (2019) on Vietnam's handicraft exports shows that there is a positive relationship between these and other factors, which include Vietnam's GDP, importer's GDP, the population of the trading partner, Vietnam's openness, the language of the trading partner, the economic separation of the importer and Vietnam, and both being members of the Asia–Pacific economic cooperation.

Early work in this area focused primarily on testing technological adoption theories involving the theory of reaction action (Fishbein & Ajzen, 1975), the TAM (Davis, 1989), and the TOE framework (Tornatzky & Fleischer, 1990). The results of Pillai and Sivathanu's study (2020) contribute to the understanding of the adoption of artificial intelligence technology for talent acquisition. The findings indicate that there is a positive relationship between the adoption of artificial intelligence technology and some other factors, including the support of from the top management, relative advantage, the readiness of human resources, cost-effectiveness, the pressure of competitiveness, and the support of artificial intelligence vendors. Conversely, security and privacy have a negative influence on the adoption of artificial intelligence technology. Awa and Ojiabo (2016) found that the adoption of enterprise resource planning (ERP) in SMEs is based on technological factors that are more influential than organizational and environmental aspects. Similarly, Walker and Brown (2020) also provide a detailed analysis of technological, organizational, and environmental factors that affect the adoption of extensive data analytics in a large telecommunications organization in South Africa. The study by Chandra and Nanda Kumar (2018) is known for its results showing that the support from the top management, relative advantage, the competitiveness of technology, and consumer readiness significantly affect the adoption of augmented reality by the organization for electronic commerce.

Furthermore, Pateli et al. (2020) have detected seven elements that impact organizational adoption of social networks in the hospital industry: relative advantage, presence, interconnections, support from the top management, innovation, external pressure, and uncertainty about the environment. Some research was carried out for different countries. The results reported by Ahmed (2020) reveal that the adoption of cloud computing by SMEs in Bangladesh is undoubtedly influenced by technology, environment, and organizational factors. The study by some authors (Upadhyay et al., 2021) shed more light on blockchain adoption to identify the chances and threats of flawless operation in the automotive industry in England, United Kingdom (UK). Mahakittikun et al. (2021), using the TOE framework, investigated the mindset of Thailand traders related to mobile payments in the service and retail fields. The results of their study denote elements of the TOE framework influencing a company's performance, namely, the benefit of relativeness, the pressure of competitiveness, the knowledge of mobile payment, innovation, critical mass, and exterior support. However, the innovation factor affects the firm's performance, which is more vital than others, and critical mass is the only factor that has an opposite influence on firm performance.

In addition, several studies demonstrate applications of contemporary digital technologies for digital transformation in creative industries. For example, Jones et al. (2015) showed the effectiveness of social networks and websites that expand attention and inquiry, gain new clients, have good consumer relationships, and improve the image of companies. In their descriptive survey of television viewers, domestic television companies, and national television associations, some authors (Kaltum et al., 2016) found digital transformation as a platform to handle issues of broadcast coverage limitations and improve business paradigms in the digital television industry. Sadlowska et al. (2019), in their study of independent cinema in Scotland, UK, concluded that digitalization had to be applied to improve current activities and innovation of business patterns. In the fashion industry, Bertola and Teunissen (2018) prove

that working parts, procedures, and units of business are affected by digital transformation based on the 4IR framework. The case study of Arribas and Alfaro (2018) also presents a 3D technology applicable to the fashion industry based on the concept of the consumer. The authors show the way for a fashion designer who applies 3D digital technology to software companies to create a value chain between the idea of the design and the consumer. Leovaridis and Bahnă (2017) conducted an experiment to interview entrepreneurs from three European countries in creative industries, which contained architecture, journalism, and advertising. The results of the study indicate that technological innovation strategies such as virtual reality make benefit competitiveness from the effect of communication in advertising and journalism, and the gain from the profit in the architecture industry. Similarly, some authors (Margetis et al., 2021) also suggested virtual and augmented technologies in museums that help visitors look through, experience, and interact with realistic virtual museums.

Digital transformation needs a specific plan, process, and roadmap. The research by Abdallah et al. (2022) has shown eight necessary steps involved in the digital transformation process in the manufacturing sector. They can conver investing in tech and tools, training employees, creating a flexible budget, including all departments in strategy, testing the project in one business segment, sharing master plans and objectives with staff, assigning a sponsor to a project, and sharing a scheme with clients. Besides, Ministry of Information and Communications (Vietnam) issued digital transformation indexes applicable to enterprises (Ministry of Information and Communications, 2021) at the end of 2021. The digital transformation process includes six levels, from zero to five. In these levels, 0 is not yet a digital transformation, level 1 is the start-up of digital transformation, level 2 means that enterprises have understood the importance and benefits of business operations from digital transformation. Further, level 3 is the state when digital transformation is deployed in each department in enterprises, starting the formation of digital companies. The next one, level 4 means digital companies with digital platforms, digital technologies, and digital data. Finally, level 5 is the highest level of enterprises with the role of a leader in digital transformation, creating a digital business ecosystem. As a result, enterprises that have levels lower than 3 cannot be considered digital companies, and the digital transformation adoption is only carried out in companies from this level. Nevertheless, the issuance of levels of the digital transformation process is too new for enterprises in Vietnam to apply immediately, so it needs more time and routes to be implemented.

The researchers essentially agreed with Tornatzky and Fleisher (1990) that the three TOE contexts influence adoption, but these researchers then assumed that there is a unique set of factors or measures for each specific technology or context examined (Baker, 2012). The digital transformation adoption can be seen as a critical decision that improves business activities in companies and corporations, in which the technological context includes high technology platforms derived from the application of information technology (Awa et al., 2015). Some authors (Kunz et al., 2017) reveal that the sustainability of customer engagement is based on the data-driven depending on engagement behaviors of clients and the company's value brought to customers in the study of customer engagement in the big data world. According to some authors (Pappas et al., 2018), big data describes a large quantity of data, such as information generated and stored in the digital media ecosystem. Trabucchi

et al. (2017) used a two-sided advertising system to give a case study analysis as another example of big data capture and analytics in their study. Artificial intelligence is integrated into products and services, making them more intelligent (Shankar, 2018). Anantrasirichai and Bull (2022) also point out that artificial intelligence is most beneficial when it is human-centric and built to supplement rather than replace human ingenuity in creative industries. Furthermore, augmented and visual reality applications can help people enhance their visit to the museum from far away (Clini et al., 2014; Hyungsoo Jung & tom Dieck, 2017). In an analysis of 3D virtual simulation systems, Choi (2022) indicates that their impacts advance fashion design using 3D virtual simulation, co-design, and online customization. The research conducted by Dutra et al. (2018) involved blockchain-enabled business models with companies in creative industries, and the findings indicate that advanced applications and business models replace the management of companies. A detailed study of digital creative industries and blockchain by Patrickson (2021) shows that distributed ledger technologies, such as blockchain, hold the promise of faster transactions, more trade transparency, and more options for direct payment to creative companies. Nuseir (2018) also argues that the benefits of digital marketing activities are online, in unlimited geographic distance for businesses and clients. Similarly, some authors (Mazzucchelli et al., 2021) conducted an empirical study based on a survey to show the role of *Facebook* in online advertising for developing engagement and brand networks, implementing related-customer activities, performing market analysis, and as an online sales channel to replace traditional sales.

Based on the analysis of UNCTAD (2018), in particular, advanced technologies are applied in creative industries for digital transformation measured by factors (big data capture and analytics, augmented reality, artificial intelligence, virtual reality, blockchain, digital marketing and advertising online), so the following research hypotheses related to the digital transformation adoption in the technological context of creative industries have been developed:

H1a: Big data capture and analytics positively influence the digital transformation adoption;

H1b: Augmented reality positively influences the digital transformation adoption;

H1c: Artificial intelligence positively influences the digital transformation adoption;

H1d: Virtual reality positively influences the digital transformation adoption;

H1e: Blockchain positively influences the digital transformation adoption;

H1f: Digital marketing and advertising online positively influence the digital transformation adoption.

For the organizational context, Chandra and Nanda Kumar (2018) propose to examine factors for the adoption of augmented reality, such as financial capabilities, understanding of decision-makers, and the aid of senior management. Awa et al. (2015) also focus on factors for adopting electronic commerce, such as the organization mission, social influences, and the company size. According to the study by Wang and Zhu (2021), social influence is the key to social media knowledge spread. People, leaders, celebrities, presspeople, and organizations utilize social networks to share information. Fabac (2022) studies a digital balanced scorecard for digital transformation. He considers that the mission and vision of the organization digital transformation based on digital ecosystems play a crucial role in the deployment ideas of a traditional digital balanced scorecard system. Furthermore, one interesting finding of

Khemakhem Jardak and Ben Hamad (2022) shows that when businesses fund digital transformation, they encounter financial challenges that have a negative short-term impact on their return on assets and return on equity. Therefore, the organizational context measured by factors (financial strength, organizational mission, and social influences) with the proposed research hypotheses related to the digital transformation adoption in the organizational context of creative industries have been developed:

H2a: Social influence positively affects the digital transformation adoption;

H2b: Organisation's mission positively influences the digital transformation adoption;

H2c: Financial strength positively influences the digital transformation adoption.

For the environmental context, Hwang et al. (2016) indicate elements for the decision model of green supply chain adoption in the semiconductor industry: the customer, the competitor, and the social community. Chandra and Nanda Kumar (2018) also identify factors for adopting augmented reality, including client readiness and competitive pressure. Significantly, Xue et al. (2022) argue that digital transformation helps businesses improve cooperation and interaction with vendors, producers, clients, and other partners. However, enterprises are compelled to alter to satisfy competitive pressure and customer needs in the new digital economy (Khemakhem Jardak & Ben Hamad, 2022). Furthermore, the findings of the study by some authors (Canevez et al., 2022) prove that the effectiveness of ICT has a positive relationship with a sense of community. Hence, the environmental context measured by factors (customer, competitor, social community, and competitive pressure) along with the suggested research hypotheses related to the digital transformation adoption in the environmental context of creative industries have been developed:

H3a: Customer positively influences the digital transformation adoption;

H3b: Competitor positively influences the digital transformation adoption;

H3c: Competitive pressure positively influences the digital transformation adoption;

H3d: Social community positively influences the digital transformation adoption.

For company performance, digital transformation improves company performance, including product/service offerings, business frameworks, high technology, and company processes (Goerzig & Bauernhansl, 2018). Digitalization requires a company with deep knowledge and understanding of high technology for investment to take practical advantage of technology architecture and infrastructure (Șerban, 2017). Derived from data-driven research in big data, especially, customer engagement is sustainable if companies can satisfy clients from their worth (Kunz et al., 2017). Yerpude and Kumar Singhal (2021) also indicate that the Internet of things generates real-time data for consumer engagement analytics, which is critical to the organization's effectiveness. The value of information technology can bring business profitability, consumer surplus, and productivity; moreover, big data also involves cost reduction and improves products and services (Huang et al., 2020). Besides, the digital transformation of managerial works achieves improved labor and business model innovation (Kraft et al., 2022). Jones et al. (2015) and Nuseir (2018) recognize the benefits of the website and social networks, which are modern marketing channels to increase sales and help reduce costs. In contrast, artificial intelligence technologies improve user engagement and conversion, which increases customer satisfaction and repurchase intent (Bag et al., 2022). Similarly, Sarmah

et al. (2018) found the effectiveness of social networks for service innovation. Therefore, the company performance measured by various factors (customer engagement, profitability, cost reduction, sales growth, productivity, and innovation) with the recommended research hypotheses related to company performance have been developed:

H4a: The digital transformation adoption positively influences the customer engagement;

H4b: The digital transformation adoption positively influences profitability;

H4c: The digital transformation adoption positively influences cost reduction;

H4d: The digital transformation adoption positively influences sales growth;

H4e: The digital transformation adoption positively influences productivity;

H4f: The digital transformation adoption positively influences innovation.

The defined hypotheses of factors in three TOE contexts and company performance are shown in Table 1. Especially the study by Chandra and Nanda Kumar (2018) uses control variables consisting of the company's size, age, and location to identify the factors affecting the adoption of augmented reality. In contrast, the study by Nwankpa and Datta (2017) focuses on company size and type of industry. Therefore, this study uses control variables (company size, creative industry fields) to consider the factors influencing the digital transformation adoption and company performance.

3. Methodology

3.1. Research instrument

This study developed a questionnaire for respondents who were asked to give their opinions and complete each statement connected to a seven-point Likert-type scale ranging from 1 to 7, one revealing strongly disagree and seven indicating strongly agree. Measurement instruments related to digital transformation adoption, technological context, organizational context, environmental context, and company performance are shown in Table 1.

Table 1. Measurement instruments (source: created by authors)

ASPECTS	SURVEY QUESTIONS OF FACTORS		HYPOTHESES DEFINED
	Factors	Sources	
Technological context	Eighteen survey questions (observed variables) are about BD (1*), AR (2*), AI (3*), VR (4*), BLO (5*), and DMA (6*)	Chandra and Nanda Kumar (2018)	H1a – H1f
Organizational context	Nine survey questions (observed variables) are about SI (7*), OM (8*), and FS (9*)	Venkatesh et al. (2003); Karatepe and Aga (2016); Chandra and Nanda Kumar (2018)	H2a – H2c
Environmental context	Twelve survey questions (observed variables) are about CUS (10*), COM (11*), CP (12*), and SC (13*).	Tripopsakul (2018); McKinnie (2016); Hwang et al. (2016)	H3a – H3d

End of Table 1

ASPECTS	SURVEY QUESTIONS OF FACTORS		HYPOTHESES DEFINED
	Factors	Sources	
Company performance	Nineteen survey questions (observed variables) are about CS (14*), PRO (15*), COS (16*), SAL (17*), PD (18*), and INN (19*).	Kunz et al., 2017; Veselovsky et al., 2019; Schwertner, 2017; Gil-Gomez et al., 2020; Liere-Netheler et al., 2018; Rodriguez et al., 2016; Gwee, 2009; Haseeb et al., 2019; Huang et al., 2020; Müller et al., 2009; Markides, 2006	H4a – H4f
Digital transformation adoption	Four survey questions (observed variables) are about DT (20*).	Tripopsakul, 2018	

Notes: 1*: BD – big data capture and analytics; 2*: AR – augmented reality; 3*: AI – artificial intelligence; 4*: VR – virtual reality; 5*: BLO – blockchain; 6*: DMA – digital marketing and advertising online; 7*: SI – social influence; 8*: OM – organization mission; 9*: FS – financial strength; 10*: CUS – customer; 11*: COM – competitor; 12*: CP – competitive pressure; 13*: SC – social community; 14*: CS – customer engagement; 15*: PRO – profitability; 16*: COS – cost reduction; 17*: SAL – sales growth; 18*: PD – productivity; 19*: INN – innovation; 20*: DT – digital transformation adoption.

3.2. Population, sampling, and data collection

The survey focuses on Hanoi and Ho Chi Minh City with many established creative companies. The acceptable sample size was a 10:1 ratio between the survey participants and the observed variables for this study (Hair Jr. et al., 2009; Watson et al., 2014), so the minimum sample size is 620 participants for this study based on the number of observed variables as shown in Table 1. The sampling technique was snowball sampling (Cohen et al., 2007); this method is a nonprobability sampling technique in which small individual groups of creative companies were surveyed and asked to identify others to participate in the study.

Data collection was implemented from October, 2020 to July, 2021. This study takes advantage of high technology through over-the-top applications and social networks to send survey forms, communications, and interactions to participants; for example, *Facebook*, *Viber*, *LinkedIn*, *Skype*, *Zalo*, and electronic mail. The survey participants were middle and senior managers of creative companies in Vietnam. As a result, there were 674 respondents, as detailed in demographic statistics in Table 2.

3.3. Data analysis procedure

Data analysis used a combination of the statistical package for the social sciences *SPSS* (version 25) and analysis of moment structures *AMOS* (version 25) software. The testing process was conducted in several steps that included descriptive statistics, Cronbach's alpha reliability test, exploratory factor analysis, confirmatory factor analysis (CFA), structural equation modeling (SEM), and multigroup invariance analysis (MIA) (Hair Jr. et al., 2009; Byrne, 2009).

4. Empirical results

4.1. Demographic information

Table 2 provides detailed information on the respondents in middle management and above, in which the survey represented five of nine fields of creative industries, such as design, creative services, new media, audiovisuals, publishing, and printed media. However, there were no other fields including traditional culture, cultural sites, visual arts, and performing arts, because the digital transformation adoption in these fields was still not widespread at the time of the research. Furthermore, these results indicated that surveyed participants worked in five areas representing Vietnam's creative industries based on the results of the snowball sampling technique.

However, the participation rate of the surveyed was low in large companies, and Ho Chi Minh City was the location that was the most responsive, with 64.2% compared to others. Owners, chief officers, and middle managers as respondents reached 12.8%, 44.7%, and 34.7% in the survey, respectively. Males were in majority, about 75.2% compared to 24.8% of females. Participants with bachelor's degree, 70.8%, outnumbered those with master's degrees more than three times, and doctor's degrees were the lowest, with 2.8%.

Table 2. Demographic statistics of the respondents (source: created by authors)

Gender		Educational qualifications		Location of companies	
Male	507 (75.2%)	Secondary school diploma	27 (4%)	Hanoi, Vietnam	154 (22.8%)
Female	167 (24.8%)	Bachelor's degree	477 (70.8%)	Ho Chi Minh City, Vietnam	433 (64.2%)
		Master's degree	151 (22.4%)	Others	87 (12.9%)
		Doctoral degree	19 (2.8%)		
Job titles		Size of companies (people)		Creative industry fields	
Owner	86 (12.8%)	1–50	171 (25.4%)	Design	73 (10.8%)
Chief executive officer	88 (13.1%)	51–100	159 (23.6%)	Creative services	164 (24.3%)
Chief financial officer	44 (6.5%)	101–500	134 (19.9%)	New media	141 (20.9%)
Chief technology officer	82 (12.2%)	501–1000	184 (27.3%)	Audiovisuals	211 (31.3%)
Chief digital officer	35 (5.2%)	1001 and 5000	19 (2.8%)	Publishing and printed media	85 (12.6%)
Chief information officer	52 (7.7%)	5001 and more	7 (1%)		
Middle managers	234 (34.7%)				
Others	53 (7.9%)				

4.2. Reliability results

The analysis of Cronbach's alpha reliability reveals that four factors, blockchain (BCH), financial strength (FS), social community (SC), and cost reduction (CR), were eliminated because the

Cronbach's alpha coefficients were less than 0.7 (Hair Jr. et al., 2009; Tavakol & Dennick, 2011). Other factors were greater than 0.8, indicating a good stability for examining the research framework model.

4.3. Exploratory factor analysis

The purpose of this method was to test the Kaiser–Meyer–Olkin (KMO) test measure of sampling adequacy (MSA) and the Bartlett's test of sphericity for exploratory factor analysis following the rule of thumb 2 of some researchers (Hair Jr. et al., 2009). A statistically significant Bartlett's test of sphericity indicates enough correlations to proceed when *p*-value is less than 0.05. The measurement of MSA must be greater than 0.5 for both overall and per variable and eliminate variables that are less than 0.5.

Table 3. Results of exploratory factor analysis (source: created by authors)

FACTOR 1: CP (1*)		FACTOR 2: PD (2*)		FACTOR 3: SI (3*)		FACTOR 4: CS (4*)	
Observed variables	Factor loading	Observed variables	Factor loading	Observed variables	Factor loading	Observed variables	Factor loading
CP2	.883	PD3	.883	SI2	.931	CS1	.899
CP3	.795	PD2	.848	SI1	.770	CS2	.893
CP1	.717	PD1	.787	SI3	.633	CS3	.780
CP4	.623			SI4	.513	CS4	.594
FACTOR 5: COM (5*)		FACTOR 6: SAL (6*)		FACTOR 7: DMA (7*)		FACTOR 8: PD (8*)	
Observed variables	Factor loading	Observed variables	Factor loading	Observed variables	Factor loading	Observed variables	Factor loading
COM1	.893	SAL2	.958	DMA2	.981	PD2	.920
COM2	.837	SAL1	.929	DMA1	.783	PD3	.829
COM3	.727	SAL3	.727	DMA3	.779	PD1	.790
FACTOR 9: AI (9*)		FACTOR 10: INN (10*)		FACTOR 11: VR (11*)		FACTOR 12: AR (12*)	
Observed variables	Factor loading	Observed variables	Factor loading	Observed variables	Factor loading	Observed variables	Factor loading
AI2	.962	INN3	.882	VR1	.849	AR2	.880
AI3	.792	INN2	.802	VR2	.848	AR1	.802
AI1	.692	INN1	.781	VR3	.703	AR3	.768
FACTOR 13: BD (13*)		FACTOR 14: CUS (14*)		FACTOR 15: OM (15*)		FACTOR 16: DT (16*)	
Observed variables	Factor loading	Observed variables	Factor loading	Observed variables	Factor loading	Observed variables	Factor loading
BD2	.944	CUS1	.825	OM2	.963	DT4	.816
BD1	.831	CUS2	.815	OM3	.738	DT2	.808
BD3	.722	CUS3	.772	OM1	.658	DT3	.773
						DT1	.701

Notes: 1*: CP – competitive pressure; 2*: PD – profitability; 3*: SI – social influence; 4*: CS – customer engagement; 5*: COM – competitor; 6*: SAL – sales growth; 7*: DMA – digital marketing and advertising online; 8*: PRO – productivity; 9*: AI – artificial intelligence; 10*: INN – innovation; 11*: VR – virtual reality; 12*: AR – augmented reality; 13*: BD – big data capture and analytics; 14*: CUS – customer; 15*: OM – organization mission; 16*: DT – digital transformation adoption.

After using the principal axis factoring along with the promax rotation method, the KMO test measure of sampling adequacy (KMO = 0.93) was greater than 0.5, and Bartlett's test of sphericity (Chi-squared = 24301.84, difference = 1326, *p*-value = 0.000) was significant at the level of $p < 5\%$ level. Primarily, Table 3 denotes 16 extracted factors (factor loadings > 0.5), in which the eigenvalue was greater than one, and the total variance explained reached 69.84% (Hair Jr. et al., 2009; Mohammed et al., 2016; Henson & Roberts, 2006).

4.4. Confirmatory factor analysis

Following the instruction of some researchers (Hair Jr. et al., 2009; Fan et al., 2016), this part considers the model fit indices in confirmation factor analysis such as Chi-squared test ($\chi 2$), minimum discrepancy per degree of freedom (CMIN/DF), comparative fit index (CFI), Tucker–Lewis index (TLI), and the root mean square error of approximation (RMSEA). Furthermore, according to the rule of thumb 1 of some researchers (Hair et al., 2009), the construct validity is ideal when standardized loadings are greater than or equal to 0.5, the average variance extracted (AVE) also requires the same value, and the construct reliability should not be less than 0.7 for adequate convergent validity. However, discriminant validity is only supported if the AVE is greater than the maximum shared variance (MSV) between the constructs and the AVE estimates for the two factors exceed the square of the correlation between factors.

As can be seen from Figure 1, the findings of CFA have a good model fit, which is within the range (χ^2 = 2829.5, p = 0.000, CMIN/DF = 2.452, CFI = 0.929, TLI = 0.919, and RMSEA = 0.046) (Hair et al., 2009; Fan et al., 2016). Furthermore, the construct validity results (AVE > 0.5, composite reliability > 0.7, AVE > MSV, square root of AVE > inter-construct correlation) are supported for all constructs, and the standard loading analysis exceeds 0.5 to meet the requirements of convergence validity and discriminant validity (Hair Jr. et al., 2009; Soares & Pinho, 2014; Akter et al., 2016). Therefore, the CFA results have verified a good fit for evaluating the following SEM analysis.

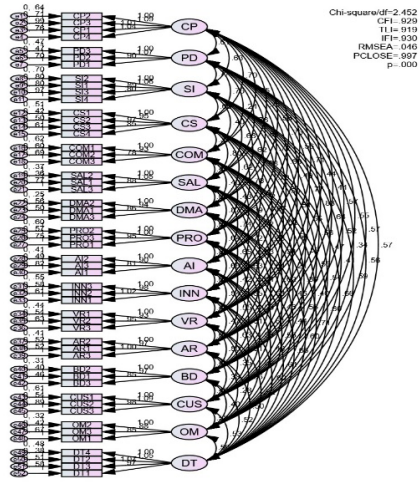

Figure 1. Sixteen correlated first-order factors of confirmatory factor analysis (source: created by authors)

4.5. Structural equation modeling analysis

As can be seen from Figure 2, it is apparent that the analysis results fit the model within the range (χ^2 = 3182.7, p = 0.000, CMIN/DF = 2.630, CFI = 0.917, TLI = 0.909, and RMSEA = 0.049) (Hair Jr. et al., 2009; Fan et al., 2016). The data's most significant aspect is presented in Table 4, which reveals that the research hypotheses were statistically significant at 1% and 5%. As a result, each pair of factors was positively affected, as shown in Table 4.

There were statistically significant findings of testing hypotheses (H1a, H1b, H1c, H1d, and H1f; H2a, and H2b; H3a, H3b, and H3c; H4a, H4b, H4d, H4e, and H4f). In which big data capture and analytics, augmented reality, artificial intelligence, virtual reality, digital marketing and advertising online, social influence, organization mission, customer, competitor, and competitive pressure have positive effects on the digital transformation adoption. Likewise, digital transformation adoption positively influenced customer engagement, profitability, sales growth, productivity, and innovation. Furthermore, the coefficient of determination of digital transformation adoption was 82.4%, which means that the fluctuation of digital transformation adoption is clarified by 82.4% of independent factors and is explained similarly to the coefficient of determination of customer engagement, profitability, sales growth, productivity, and innovation.

In particular, the results of testing hypotheses (H1a, H1b, H1c, H1d, H1f) agree with the study by Chandra and Nanda Kumar (2018) that revealed the relative advantage of technology that positively influences the adoption of augmented reality. Other results, such as hypotheses (H4a, H4b, H4d, H4e, H4f), were first explored by this study. However, the result of the testing hypothesis (H2a) is not in line with some researchers (Venkatesh et al., 2003), who found a non-significant effect of social influence on behavior intention in the study of user acceptance of information technology. The outcomes of hypotheses (H3a and H3c) are consistent with Tripopsakul (2018), who identified the importance of competitive pressure and

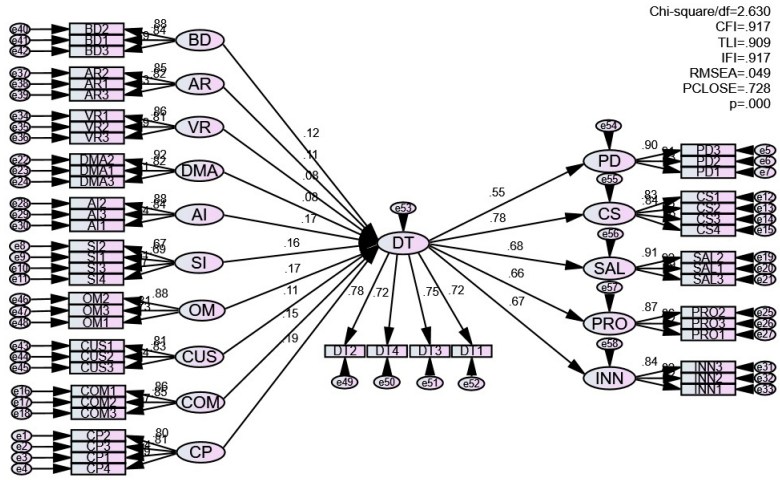

Figure 2. The structural equation modeling results (source: created by authors)

Table 4. Results of structural equation modeling analysis (source: created by authors)

Research hypotheses		Standardized regression weights	*p*-value	Results	Coefficient of determination	
H1a	BD (1*) --> DT (2*)	.124	.000***	Supported	DT	.824
H1b	AR (3*) --> DT	.108	.002***	Supported	CS	.614
H1c	AI (4*) --> DT	.171	.000***	Supported	PRO	.437
H1d	VR (5*) --> DT	.077	.022**	Supported	SAL	.461
H1f	DMA (6*) --> DT	.077	.022**	Supported	PD	.306
H2a	SI (7*) --> DT	.158	.000***	Supported	INN	.447
H2b	OM (8*) --> DT	.172	.000***	Supported		
H3a	CUS (9*) --> DT	.110	.001***	Supported		
H3b	COM (10*) --> DT	.151	.000***	Supported		
H3c	CP (11*) --> DT	.188	.000***	Supported		
H4a	DT --> CS (12*)	.783	.000***	Supported		
H4b	DT --> PRO (13*)	.661	.000***	Supported		
H4d	DT --> SAL (14*)	.679	.000***	Supported		
H4e	DT --> PD (15*)	.553	.000***	Supported		
H4f	DT --> INN (16*)	.669	.000***	Supported		

Notes: *The results are statistically significant at 10%; ** The results are statistically significant at 5%; *** The results are statistically significant at 1%; 1*: BD – big data capture and analytics; 2*: DT – digital transformation adoption; 3*: AR – augmented reality; 4*: AI – artificial intelligence; 5*: VR – virtual reality; 6*: DMA – digital marketing and advertising online; 7*: SI – social influence; 8*: OM – organization mission; 9*: CUS – customer; 10*: COM – competitor; 11*: CP – competitive pressure; 12*: CS – customer engagement; 13*: PRO – profitability; 14*: SAL – sales growth; 15*: PD – productivity; 16*: INN – innovation.

customers related to the adoption of social media by entrepreneurial students. However, the findings of testing (H3b, H3c) differ considerably from the results introduced by McKinnie (2016) and Oliveira et al. (2014) about no relationship between competitive pressure and the adoption of cloud computing in their study. Moreover, the consequence of hypothesis (H2b) proved that it is in line with the study of Karatepe and Aga (2016), who had detected the positive effect of the organization's mission on job performance.

4.6. Multigroup invariance analysis

The MIA focuses on two control variables: the size of companies and the fields of the creative industry. This part combines the groups as shown in Tables 5–6. MIA is based on Byrne (2009), who indicates two approaches for comparative tests of multigroup invariance: the traditional χ^2 difference approach and the practical CFI difference approach. We calculate the χ^2 difference ($\Delta\chi^2$), degree of freedom difference (Δdf), and the probability of $\Delta\chi^2$ for the multigroup invariance and non-invariance test. Findings of control variables were related to χ^2 difference value of the creative industry fields ($\Delta\chi^2$ = 91.76, Δdf = 30, p = 0.000% < 5%), and the size of the company ($\Delta\chi^2$ = 82.22, Δdf = 45, p = 0.013% < 5%); as a result, these χ^2 difference values were statistically significant, which means there was the difference of factor loadings among groups and multigroup non-invariance (Byrne, 2009; Her et al., 2019).

Table 5. Multigroup invariance analysis based on creative industry fields (source: created by authors)

RESEARCH HYPOTHESES		DESIGN AND NEW MEDIA		CREATIVE SERVICES, PUBLISHING AND PRINTED MEDIA		AUDIOVISUALS	
		Standardized regression weights (SRW)	*p*-value	SRW	*p*-value	SRW	*p*-value
H1a	BD (1*) --> DT (2*)	–.032	.655	.151	.007***	.187	.005***
H1b	AR (3*) --> DT	.120	.050**	.098	.100*	.077	.185
H1c	AI (4*) --> DT	.053	.340	.308	.000***	.099	.104
H1d	VR (5*) --> DT	.057	.262	.105	.085*	.127	.048**
H1f	DMA (6*) --> DT	.104	.102	.093	.082*	–.019	.774
H2a	SI (7*) --> DT	.205	.002***	.112	.071*	.157	.033**
H2b	OM (8*) --> DT	.154	.007***	.110	.033**	.209	.004***
H3a	CUS (9*) --> DT	.074	.169	.162	.006***	.180	.005***
H3b	COM (10*) --> DT	.106	.038**	.205	.000***	.041	.434
H3c	CP (11*) --> DT	.402	.000***	.007	.889	.270	.000***
H4a	DT --> CS (12*)	.785	.000***	.729	.000***	.790	.000***
H4b	DT --> PRO (13*)	.759	.000***	.631	.000***	.498	.000***
H4d	DT --> SAL (14*)	.828	.000***	.568	.000***	.595	.000***
H4e	DT --> PD (15*)	.637	.000***	.461	.000***	.525	.000***
H4f	DT --> INN (16*)	.719	.000***	.551	.000***	.685	.000***
Coefficient of determination (R squared), DT		.897		.832		.812	
R squared, CS		.616		.532		.624	
R squared, PRO		.576		.398		.248	
R squared, SAL		.685		.322		.353	
R squared, PD		.406		.212		.276	
R squared, INN		.517		.304		.470	
Observations		214		249		211	

Notes: *The results are statistically significant at 10%; ** The results are statistically significant at 5%; *** The results are statistically significant at 1%; 1*: BD – big data capture and analytics; 2*: DT – digital transformation adoption. 3*: AR – augmented reality; 4*: AI – artificial intelligence; 5*: VR – virtual reality; 6*: DMA – digital marketing and advertising online; 7*: SI – social influence; 8*: OM – organization mission; 9*: CUS – customer; 10*: COM – competitor; 11*: CP – competitive pressure; 12*: CS – customer engagement; 13*: PRO – profitability; 14*: SAL – sales growth; 15*: PD – productivity; 16*: INN – innovation.

As detailed in Table 5, three groups were merged and considered: design and new media, creative services with publishing and printed media, and audiovisuals. The results showed that H1a, H1c, H2b, H3a, and H3b were statistically significant by 1% and 5% in the group of creative services with publishing and printed media. However, the audiovisual group had different results, which were H1a, H1d, H2a, H2b, H3a, and H3c, and similarly H1b, H2a, H2b, H3b, and H3c in the design and new media group. In particular, H4a, H4b, H4d, H4e, and H4f were also statistically significant in all three groups.

Table 6. Multigroup invariance analysis based on the size of companies (source: created by authors)

RESEARCH HYPOTHESES		GROUP 1		GROUP 2		GROUP 3		GROUP 4	
		Standardized regression weights (SRW)	*p*-value	SRW	*p*-value	SRW	*p*-value	SRW	*p*-value
H1a	BD (1*) --> DT (2*)	.078	.341	.107	.183	.057	.360	.268	.000***
H1b	AR (3*) --> DT	.178	.008***	.089	.269	–.006	.947	.045	.415
H1c	AI (4*) --> DT	.271	.000***	.223	.030**	.332	.007***	.034	.504
H1d	VR (5*) --> DT	.057	.359	.148	.097*	.110	.153	.073	.189
H1f	DMA (6*) --> DT	.125	.128	.048	.482	.109	.194	.019	.744
H2a	SI (7*) --> DT	.258	.005***	.057	.513	.029	.807	.196	.011**
H2b	OM (8*) --> DT	.201	.010***	.039	.590	.026	.675	.329	.000***
H3a	CUS (9*) --> DT	.250	.000***	.039	.606	.104	.156	.031	.629
H3b	COM (10*) --> DT	.088	.125	.234	.000***	.196	.003***	.076	.147
H3c	CP (11*) --> DT	.049	.492	.306	.002***	.205	.023**	.187	.003***
H4a	DT --> CS (12*)	.672	.000***	.744	.000***	.795	.000***	.835	.000***
H4b	DT --> PRO (13*)	.596	.000***	.716	.000***	.731	.000***	.572	.000***
H4d	DT --> SAL (14*)	.624	.000***	.632	.000***	.818	.000***	.666	.000***
H4e	DT --> PD (15*)	.512	.000***	.590	.000***	.556	.000***	.522	.000***
H4f	DT --> INN (16*)	.720	.000***	.568	.000***	.646	.000***	.718	.000***
Coefficient of determination (R squared), DT		.914		.811		.869		.836	
R squared, CS		.451		.554		.632		.697	
R squared, PRO		.355		.513		.535		.327	
R squared, SAL		.389		.399		.669		.443	
R squared, PD		.262		.348		.309		.273	
R squared, INN		.518		.322		.418		.516	
Observations		171		159		134		210	

Notes: *The results are statistically significant at 10%; ** The results are statistically significant at 5%; *** The results are statistically significant at 1%; 1*: BD – big data capture and analytics; 2*: DT – digital transformation adoption; 3*: AR – augmented reality; 4*: AI – artificial intelligence; 5*: VR – virtual reality; 6*: DMA – digital marketing and advertising online; 7*: SI – social influence; 8*: OM – organization mission; 9*: CUS – customer; 10*: COM – competitor; 11*: CP – competitive pressure; 12*: CS – customer engagement; 13*: PRO – profitability; 14*: SAL – sales growth; 15*: PD – productivity; 16*: INN – innovation.

As shown in Table 6, four groups were created. The company with 1 and 50 people is called group 1, the size of 51–100 people is referred to as group 2, 101–500 people as group 3, and 501+ people as group 4 (combined groups 501–1000, 1001–5000, and 5001 and more). The analyzed results revealed a positive relationship between big data capture and analytics and customer engagement, profitabilitysales growth, productivity, and innovation in all the four groups. Different results were found in other groups: H1a, a unique research hypothesis, was statistically significant in group 4, and the same as H1b in group 1 and H3a in group 3. In particular, H1c was also statistically significant for groups 1, 2, and 3, and H3c for groups 2, 3, and 4.

5. Discussion

From the analyzed results, five factors of technological context (big data capture and analytics, augmented reality, artificial intelligence, virtual reality, digital marketing and advertising online) positively affected the digital transformation adoption, thus the defined hypotheses (H1a, H1b, H1c, H1d, and H1f) can be accepted. Two factors in the organizational context (social influence and the organization mission) also positively influenced the digital transformation adoption, so the denoted hypotheses (H2a and H2b) have been verified. The last part of the TOE framework is the environmental context; three factors (customer, competitor, and competitive pressure) positively impacted the digital transformation adoption; therefore, the specified hypotheses (H3a, H3b and H3c) are acceptable. Five factors (customer engagement, profitability, sales growth, productivity, innovation) that belong to company's performance were positively affected by the digital transformation adoption, which means that the determining hypotheses (H4a, H4b, H4d, H4e, and H4f) can also be accepted. However, two control variables (company size and creative industry fields) were separated into many groups for invariance analysis. The results indicate that the groups are non-invariance; in other words, there is a difference in the study results between groups when determining the factors that affect the digital transformation adoption, and company's performance is affected by digital transformation adoption, as shown in Tables 5–6. Concerning these, it can be seen that factors based on technology, organization, and environmental context have positively impacted the digital transformation adoption in creative companies in Vietnam's creative industries.

For the technological context, this study proves that technologies, big data capture and analytics (H1a) and artificial intelligence (H1c), have many competitive advantages, including collecting customer data, providing insight, analyzing the market, competitors, consumer trends through their behaviors, and evaluating business goals. Furthermore, these technologies can detect users on social networks through demographics, gender, income, age, and interests. The finding of H1a is in line with the results by Nasrollahi et al. (2021), which show that adopting big data can impact economic and operational performance. Artificial intelligence enables more intelligent systems (Oztemel & Gursev, 2020). This study's results are contrary to that of some researchers (Rosa et al., 2022), who detected that the main barriers in adopting artificial intelligence are the expenses of the investment and the loss of connection between humans and clients; however, financial strength pressure is not a concerning factor of creative companies' top management in embracing digital transformation adoption. In digital marketing and advertising online (H1f), for example, the advantages of big data are the minimum cost of digital advertising for companies (Jobs et al., 2016). Furthermore, big data is not only used in market research but also consists of information technology, operations, and other companies. One example of a big media corporation in the world, *Netflix*, is applying big data to provide online video and movies (Sarstedt & Mooi, 2019). About augmented reality (H1b) and virtual reality (H1d), this research detected that these technologies are crucial components of the digital ecosystem and improve customer experiences, which enhance consumer engagement rates, as well as increase data representation with spatial computing intelligence (Pangilinan et al., 2019).

Interestingly, this research (H1b and H1d) agrees with the study by some researchers (Olshannikova et al., 2015), which indicated that augmented reality and virtual reality might apply to big data visualization. Similarly, the findings of Siriborvornratanakul (2018) proved that augmented reality systems improve user's experiences and technical issues. Innovative products apply augmented reality technology to collect helpful information from user interaction for developed creative cultural product recommendations (Peng, 2013) and advance the experience in visiting museum (Clini et al., 2014). It is also helpful for clients to choose the right size and style of products in the online fashion field from applications that are implemented in augmented reality/virtual reality. More significantly, creative companies in digital media publish a variety of digital content to the public that is easy to read, listen to and watch online or print newspapers through intelligent devices at the same time as the event happens with the support of augmented reality/virtual reality. Along with the strong development of social networks, broadcasters have quickly adopted virtual studios and automated studio systems with augmented reality/virtual reality technologies to produce television programs with various experiences for viewers, as well as presenting realism and vibrancy in each program. With these goals, creative companies achieve the benefits of activating technological innovations in digital transformation like big data capture and analytics, augmented reality, virtual reality, artificial intelligence, digital marketing and advertising online.

For the organizational context, this study discovered that two factors, social influence (H2a) and organizational mission (H2b), play a fundamental role in adopting digital transformation in creative companies. It can be considered that the explosion of ICT and social networks has dramatically affected people's lives; therefore, people have many opportunities to express themselves, connect with the community, and share new content and knowledge. In other words, according to Smailovic et al. (2018), social influence is a factor related to feelings, thoughts, and actions. As such, a new product or service launch needs to enable a consumer who is easy to access and process following customized and personalized trends (Kim & Chandler, 2018). This comment is consistent with innovative products/services in creative industries on how to provide the content or advertisement for the right user and viewer. Additionally, this study is also aware of the organizational mission that is an underlying and core value for innovative firms to apply new modern technologies in daily business operations because the adoption of digital transformation not only updates new technology systems but also changes the culture of the company, especially the digital culture. The top and middle management play a crucial role in the impact of the digital transformation process. Based on our study results, it can be stated that social influence and organizational mission play a key role in enhancing awareness of high technology benefits; moreover, the qualification of employees and leaders significantly impacts the behavior and decision of digital transformation of in creative companies.

In terms of environmental context, this research has also identified that three factors, customer (H3a), competitor (H3b), and competitive pressure (H3c), are a vital part of the adoption of digital transformation in creative companies. As analyzed above, to meet customer requirements and demands, many creative companies are forced to use high technologies to improve customer experience and interaction through intelligent equipment such as mobile apps, social media, live chat, bot chat, and other similar things. Simply put, improving the

customer experience increases client satisfaction (Gil-Gomez et al., 2020) based on product and service satisfaction (Lee et al., 2018). In the same way, competitive pressure and competitors are strong motivators to promote production or service development, so creative companies are forced to apply modern technologies and science, improve labor productivity, and manage their organization effectively. Innovative products and services are better quality, more diverse, and have more beautiful designs to meet society's growing demand, stimulate development request, and contribute to improving the quality of social life and the development of the Vietnamese economy. An example is the research by Tripopsakul (2018), which pointed out the adoption of social media technologies. The study shows that young entrepreneurs can manage their businesses and communicate effectively with their clients about the quality of products and services, as well as resist competitors with the lowest cost. Similar results were obtained in the experiment by some researchers (Ur Rahman et al., 2020), where competitor and customer pressure positively impacted SMEs' adoption of social media. As such, the external environments pressure, such as customers, competitors, and competitive pressure, is the excellent driving motivation that helps creative companies get ready for digital transformation to improve their competitiveness compared to other competitors in similar fields.

For company performance in creative businesses in Vietnam, the essential thing proved in this study is five factors related to company performance, including customer engagement (H4a), profitability (H4b), sales growth (H4d), productivity (H4e), and innovation (H4f), which have a positive relationship with the digital transformation adoption. It can be said that this investigation also identifies the benefits of digital transformation adoption in creative companies, such as gaining modern technologies, reaching more clients, cutting operating costs, making more accurate decisions in management operations, increasing profit, and optimizing employee productivity. These points align with Goerzig and Bauernhansl (2018); the digital transformation adoption enhances high technologies, processes, products, and services. The current technologies also enhance profitability, consumer surplus, productivity, and cost reduction (Huang et al., 2020).

The digital transformation of creative companies can produce systems that collect the correct data for high-level business activities. Data is a primary key to unlocking customer insights, in which innovative companies can understand user behaviors and demands, which are fundamental for making business strategies to help the firm growth. Moreover, integration among high technology infrastructure enriches business operations and expands customer coverage; as a result, digital transformation changes the entire business of creative companies and dramatically improves their profit. However, digital transformation application needs deep knowledge and understanding of high technology (Șerban, 2017) and create close interaction with customers regularly to increase their satisfaction (Kunz et al., 2017). One of the biggest challenges related to digital transformation is integration between systems and infrastructure, as well as synchronization of collected and secured data. Further, the advantages of digital transformation use modern systems and tools and high technologies that work together to reduce manual tasks, improve productivity and customer experience, cost savings, and increase profits. In sum, the findings of this study confirm that digital transformation positively affects the performance of creative companies. Generating customer loyalty and

values from data-driven customer insight evaluation processes is vital. Developing innovative products and services derived from client preferences and experiences is necessary. Moreover, it also measures the effectiveness of return on investment through promoted strategies of creative goods to reach more potential clients and achieve more sales and profitability. The crucial digital transformation is the alteration of the business model, processes, architectures of infrastructure, software, and high technology, as well as the advanced skilled labor.

The next part in this research framework was investigation of two crucial control variables – including company size and creative industry fields. The MIA approach was applied to examine if the sample was divided into small groups. The results indicated that the groups are non-invariance, which means that they have a difference in the study result among groups. This conclusions differ considerably from those of Chandra and Nanda Kumar (2018), and the company size does not have a statistically significant relationship with adopting augmented reality in electronic commerce. Likewise, the firm size is not statistically significant in the adoption of electronic data interchange, but contrary to the result of the adoption of radio-frequency identification, ERP, and electronic commerce in the research of the adoption of information technology (Gangwar et al., 2014).

Our research results prove that the success of the digital transformation is based on the following fundamental reasons. First, the basis for digital transformation decisions are creative companies' internal and external factors. Second, digital transformation brings many opportunities, such as increasing the revenue and profit, maintaining good customer loyalty and relationship, developing new markets, and creating a sustainable competitive edge. Third, creative companies can optimize process management, resource allocation and increase productivity. Fourth, innovative products and services are personalized and visual interfaces derived from the new technology platforms are for users convenience. Last but not least, digital transformation improves employee engagement and reduces firm costs.

To succeed in digital transformation, however, challenges must be overcome as follows: first, the management level of creative companies must raise awareness and have a good understanding of digital transformation and the digital economy. Moreover, the investment in high technologies must be appropriate for the business field in the long-term strategy. Finally, in the digital era, creative companies must change organizational culture to become digital corporations with employees' digital mindset and must have a high consensus among the organization's relevant departments.

6. Conclusions

This empirical study has investigated the digital transformation adoption and its impact on the performance of creative enterprises in Vietnam using the TOE framework and SEM. To assess the proposed theoretical framework and test the research hypotheses, quantitative research was undertaken.

Strong evidence for the digital transformation adoption was found when big data capture and analytics, augmented reality, artificial intelligence, virtual reality, digital marketing and advertising online, social influence, organization mission, customer, competitor, and competitive pressure were taken into account. These factors had a positive effect on the adoption of

digital transformation in Vietnam's creative companies. This adoption had substantial effects on customer's engagement, profitability, sales growth, productivity, and innovation. Nevertheless, multigroup analysis based on control variables (company size, creative industry fields) found a difference between the studied groups, indicating that these variables influence the outcomes of the study hypotheses. Except for blockchain technology, the relevance of high technologies has been improved in Vietnam's creative industries, according to the analysis presented above. Moreover, the impact of society, the pressure of competitors, and consumers contribute to the promotion and implementation of digital transformation.

The findings from this study make several contributions to the current literature. They expand the literature sources on the TOE framework and enhance knowledge of the context of technology, organization, environment, digital transformation, digital technologies, and creative industries. This study also offers a methodological framework for studying digital transformation in creative industries, other technologies, industries, and geographies. Furthermore, the study results have significant implications for understanding Vietnam's creative industries' growth in technological, organizational, and environmental contexts. It enables policymakers to understand innovative enterprises in the business environment to open policies for investment encouragement. Also creative companies, researchers, and scientific communities can learn about the influence of digital transformation adoption on the company's performance in Vietnam's creative industries. The top management of creative companies might use the study results to re-evaluate their company potential and invest in digital technology to boost company performance.

However, significant limitations still need to be addressed in further studies. The investigation was conducted in one single country, Vietnam, instead of in several developing countries. The sample mainly included creative companies operating in Hanoi, Ho Chi Minh City, and a few other regions in Vietnam. Moreover, this study relied on senior management's subjective perspectives of digital transformation in the addressed companies. Finally, only selected factors were in the suggested theoretical framework, thus, the subsequent studies should detect other factors to improve the research framework.

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