

The Impact of Authentic Leadership on Employee Innovation Behavior and Work Engagement in Specialized, Fined, Peculiar and Innovative SMEs

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Abstract

Existing firms are undergoing rapid and substantial change as a result of digital transformation. Dealing with accelerating digital transformation is a difficult process for business leaders. The digital transformation process presents both an opportunity and a challenge. This paper examines how authentic leadership may contribute to increased work engagement and innovative behaviors during times of digital change, both theoretically and empirically. This study investigated data from an online survey of 305 current employees of enterprises in the fields of specialized, fined, peculiar and innovative SMEs, include information technology, media, and networking and so on. SPSS 21.0 and AMOS 23.0 were used to analyze the data. The findings indicate that authentic leadership positively impacts employee innovation behaviors and engagement, and that digital transformation moderates the relationship between authentic leadership and innovation behavior and engagement. Not only do these findings contribute to our understanding of digital transformation and extend and broaden applicable theories of authentic leadership, but they also open the way for corporate leaders to adopt appropriate behavioral techniques to encourage work engagement and innovation. Enhancing employee innovation performance, maximizing management leadership behaviors, and offering practical inspiration all contribute to the long-term success of the firm. The findings are conceptually significant and provide corporate leaders with a practical roadmap.

Keywords

Digital Transformation, Authentic Leadership, Innovative Behavior, Work

1. Introduction

Existing businesses are fast changing because of digital transformation, and it is widely understood that organizations miss the digitalization pattern today will be slower, less adaptable, and have fewer chances in the future than advanced pioneers (Westerman et al., 2014). The outbreak of COVID-19 caused significant changes in the way businesses to operate. They had to rethink key elements of their business processes and use of technology to maintain operations (Stalmachova, Chinoracky, & Strenitzerova, 2021). Utilizing opportunities alone is insufficient; overcoming digital disruption concurrently is also vital (Varshney, 2020). Digital transformation processes are widely regarded as a primary source of contention for leaders and top management responsible for reforming enterprises (Zeike et al., 2019). The labour market has seen certain occupations fade into obscurity while new ones have exploded in popularity, necessitating the urgent need to develop job-specific abilities (Gurkina, 2017). As a result, academics and practitioners alike are concerned with increasing an organization's capacity for innovation in order to thrive in this dynamic business environment. Thus, an organization's capacity for innovation is vital to its long-term success. Employees are viewed as a critical enabler of innovation (Gao et al., 2021). The digital transformation process is both an opportunity and a threat, a turning point and a crisis (Akhmetshin et al., 2019). The majority of polarisation within industries is attributable to the loss of middle-skilled positions. Both technological advancement and globalisation have played a significant influence in promoting divisiveness (Braña, 2019). Technological unemployment consequently becomes a worry for "blue collar" employees as well as "white collar" ones. (Bertani, Rabelto, & Teglio, 2020). The more businesses grow in the digital world, the more anxious employees are about their skills becoming obsolete, given that new talents emerge while existing skills evolve and expire (Syahroni, 2021). Nowadays, employees may quickly obtain information about job openings and compare employee benefits between firms, resulting in a decline in work engagement (Winasis et al., 2021). Recently, academic scholars and company entrepreneurs have shifted their focus to employee engagement, which has become a critical issue in the modern business climate (Adekanmbi & Ukpere, 2021). Concentrating on work engagement can assist businesses in surviving, and possibly even thriving, during difficult economic times (Akhmetshin et al., 2019). As a result of these dual possibilities and problems confronting company management during the digital transformation process, there is an urgent need to identify the optimal solution (Cabell, 2021). Given the apparent link between leadership behaviours and work engagement, it is critical to determine which leadership behaviours maximise work engagement (Ferrell, 2020).

Recent research consistently demonstrates that authentic leadership has a beneficial effect on employee attitudes, behaviour, and work outcomes such as job satisfaction, job dedication, innovation, organisational citizenship behaviour, and engagement (Ferrell, 2020). Zhou et al. (2014) examined the relationship between authentic leadership and innovation behaviour, considering the intervening effects of pleasant attitudes among employees. Genuine leaders with vision and perspective in Industry 4.0 who are confronted with pandemics will increase the level of innovation (Yunita et al., 2021). Not only can authentic leaders place a premium on specific contributions of inventiveness and creativity, but authentic leadership may also have a favorable effect on representative job satisfaction and engagement (Kirkpatrick, 2021).

As a result, we theorize that immediate supervisors who model authentic leadership will seek to influence their employees through their correspondence and candour, as this should be visible as a means of instilling trust in their chief's capacity to meet, for example, their needs and concerns regarding a change interaction (Kleynhans et al., 2022). Bakari et al. (2017) discovered that when employees witness their supervisor demonstrate authentic leadership, they demonstrate increased readiness for hierarchical change, which might result in an increased obligation to change, which results in additional social support for the change. This demonstrates that real pioneers may have an effect on employees' responses to a change encounter, causing them to become more committed to the change. To make the "great leap" to digitalized business, almost all employees at all organizational levels must alter their work methods and thereby participate in planning, designing, and executing changes (Larjovuori et al., 2016). This consistency of action/perception and trust fosters collaboration between supervisor and employee, hence increasing employee work engagement (Hsieh & Wang, 2015).

Until now, few people are aware of the critical role that job leadership plays in careers in digital transformation (McCarthy et al., 2021). Based on the foregoing, this article undertakes a theoretical and empirical examination of how authentic leadership positively impacts work engagement and inventive behaviour in an accelerated digital transformation environment. The findings not only contribute to our understanding of digital transformation and to the enrichment and expansion of relevant theories of authentic leadership, but also pave the way for organizational leaders to adopt appropriate behavioral methods to motivate work engagement and innovation, which is conducive to employee improvement. To improve managers' performance and leadership behavior, and to provide specific practical insights for advancing the organization's long-term development, it has significant theoretical value and practical guiding relevance.

2. Theoretical Background and Hypothesis

2.1. Authentic Leadership

Authentic leadership has been defined as an example of pioneer behavior that draws on and advances both positive mental limits and a positive moral envi-

ronment in order to cultivate more prominent mindfulness, a disguised moral point of view, adjusted data handling, and social forthrightness with regard to pioneers working with adherents, thereby encouraging positive self-improvement (Walumbwa et al., 2008). Walumbwa et al. (2008) defined authentic leadership as having four components: self-awareness, relational transparency, balanced processing, and an internalized moral perspective.

Self-awareness suggests that the leader demonstrates their own comprehension strengths and weaknesses, which implies that they assist others in realizing themselves and are conscious of their influence on others (Walumbwa et al., 2008). This may also initiate a dialogue between leaders and employees on improved methods for cooperating during the change cycle, hence increasing employee interest in the digital transformation (Alavi & Gill, 2017). Relational transparency refers to the leader's authentic presentation to others. This entails conversing candidly with devotees and having the pioneer reveal their true thoughts and feelings (Walumbwa et al., 2008). Balanced processing entails the leader remaining objective while weighing many options prior to making a decision. Additionally, these executives solicit employee attitudes that contradict their own suspicions (Walumbwa et al., 2008). Internalized moral perspective refers to the self-discipline that supports the pioneer in making decisions based on their concealed characteristics and moral ideals. Authentic leaders will be perceived in this light as someone who is consistent with their perspectives (Walumbwa et al., 2008). Authentic leadership entails pioneers treating employees with integrity, being predictable in their attributes and activities, and collaborating with employees to advance the organization (Walumbwa et al., 2008).

2.2. Digital Transformation

The term "digital transformation" refers to changes and transformations that are fueled by and based on technological advancements. Digital transformation is a broad term that refers to the change that occurs within an organization as a result of digital technology (such as the Internet of Things, artificial intelligence/machine learning, augmented reality, and in-memory computing) (Vial, 2019). Since the COVID-19 outbreak, we've seen a surge in the use of new and digital technologies by businesses seeking to communicate with their customers. Some businesses are collaborating with business partners to accelerate their digital transformation; others have built their own IT infrastructure and systems capable of serving customers and markets in the digital age; and still others have adapted changing business models to make product and service solutions more digital in order to meet future customer and market needs. Certain businesses are altering their corporate cultures in order to disrupt the status quo and accelerate their digital transformation (Nwankpa & Roumani, 2016). The sudden acceleration in the adoption of digital transformation in this manner suggests that its sluggish pre-pandemic acceptance was not due to technical impediments, but rather to individual-level impediments (Guenzi & Nijssen, 2021). Regularly ac-

accompanied by the simultaneous presentation of agile working strategies that adapt employees' work schedules, digital transformation executions stand in stark contrast to the mere acceptance of any single innovation (Kalaighnam et al., 2021). The digital transformation that occurs is critical, since it alters old systems and practices, so creating a new business environment. It requires the entire cooperation and accountability of laborer's to alter an organization. Additionally, the relationship should be facilitated by professional pioneers, in keeping with the spirit of advancement (Purba, 2021). As a result, pioneers should be adaptable and supportive of their employees who can make a difference before and after a digital transformation, while also appreciating what they bring to the table and the long-term impact they can have on the organization (Sow & Aborbie, 2018). Organizations that truly need to undergo a digital transformation should have the appropriate innovators in place to ensure reliability and victory both during and after the transformation (Sow & Aborbie, 2018).

Organizations and their leaders are facing overwhelming challenges that arise from digital transformation (Hanelt et al., 2020). The digital pioneer and the innovator have in common that they focus on digital transformation and share the primary objective of staying abreast of change (Weber, Krehl, & Buttgen, 2022). Frick et al. (2021) contends that an empowered leader is incompatible with promoting digital transformation since such leaders anticipate rapid change and an undeniable degree of self-obligation on the part of staff. However, when it comes to digital transformation, employees are unlikely to have the option of self-sufficiency. Genuine leaders contribute to the establishment of a more positive climate within the organization, where individuals increase their confidence, expectations, and strength in their work (Tak, Seo, & Roh, 2019). Due to the fast-paced nature of the corporate world, which has resulted in lessened tenacity and vulnerability, genuine pioneers may contribute to a climate of dependability (Ciftci, 2020).

2.3. Authentic Leadership and Innovative Behavior

From the organizational perspective, a proactive personality is helpful and important to improve creativeness and generate novelty to offer useful beneficial ideas (Song & Lee, 2020). Scott & Bruce (1994) describe innovative behavior as "the invention or adaption of beneficial ideas and their execution, which begins with the identification of issues and the generation of novel ideas or solutions to those problems." Employees' innovative behaviors, i.e., the invention and execution of novel arrangements in the work environment as demonstrated in routine activities, serve as a significant small reinforcement of the firm's creativity (Lukes & Stephan, 2017). Innovative actions are a challenging endeavor that require risk aversion and a departure from one's regular range of familiarity. These demand a positive climate as well as consistent leadership assistance (Fateh, Mustamil, & Shahzad, 2021). Leadership is considered as a rational factor influencing employees' creative performance and innovation (Yunita et al., 2021). Leaders that

are consistent and make their followers feel terrific without undermining them are in a better position to work with imaginative execution, which encourages them to constantly come up with original and brilliant ideas (Fateh, Mustamil, & Shahzad, 2021).

Authentic leaders communicate their perspectives and thoughts candidly and use language to organize operations. Appropriate criticism, whether positive or negative, supports employees in refining and reexamining their unique perspectives (Phuong & Takahashi, 2021). When employees perceive their leaders demonstrating genuine concern for them, they develop a sense of self-identity with them and are more willing to provide new ideas and strive toward their adoption (Khan, Ahmed, & Khan, 2021). Employees may not be able to safeguard their wacky revolutionary ideas, nor may they be able to protect themselves from fear of losing face or jeopardizing the resulting relationship. As a result, employees may have high levels of freedom and self-efficacy, which enable them to engage in creative behaviors (Phuong & Takahashi, 2021). As a result, honest leaders inspire their employees' creative abilities and actions (Zhang & Han, 2021). Additionally, scholars have established that authentic leadership has a beneficial effect on employees' innovative behavior (Semedo, Coelho, & Ribeiro, 2017; Javed et al., 2018; Ribeiro, Duarte, & Filipe, 2018; Ribeiro et al., 2019). As a result, the following hypothesis has been advanced:

H1: The authentic leadership has positive significant effects on innovative behavior.

2.4. Authentic Leadership and Work Engagement

Work engagement is defined as a good, fulfilling state of mind associated with work that is characterized by vitality, commitment, and absorption (Schaufeli et al., 2002). Leaders should always strive to strike a balance between the intellectual and emotional sentiments of their employees in order to maintain their engagement and urge them to give their all to the change and progress (Bhardwaj, Mishra, & Jain, 2021). Employees are more interested in their job when they believe their leaders to be consistent in their words and behavior and to hold moral convictions (Wang & Hsieh, 2013). Leaders demonstrated a stronger level of sincerity; employees gained increased credibility with their leaders, which resulted in increased engagement (Tak, Seo, & Roh, 2019). The behavioral qualities of authentic leaders include walking the talk, attempting to do the right thing, owning one's limits, actively leading, communicating clearly, and developing the team (Meskelis & Whittington, 2020). According to Iqbal et al. (2020), when employees believe their leader's behavior indicates authenticity, they demonstrate increased engagement in their work. Authentic leadership at all levels and honest organizational communication can foster mutual understanding between leaders and employees, hence increasing work engagement at work for the organization's benefit (Jiang & Shen, 2020).

According to Meskelis & Whittington's (2020) research, authentic leadership

increases followers' hope, trust, and positive emotions, resulting in improved work engagement. Authentic leadership is being advocated to address the trust deficit created by the required modifications to the organization's leadership decisions. Genuine leaders who work for the common good may unite their subordinates (Khan, Ahmed, & Khan, 2021). Furthermore, empirical data from various studies established the link between authentic leadership and work engagement. For example, employees' perception of authentic leadership positively affects their perception of work engagement (Anantha et al., 2022). As a result, the following hypothesis has been advanced:

H2: The authentic leadership has positive significant effects on work engagement.

2.5. The Moderator Role of Digital Transformation

New technologies are constantly being integrated into our daily lives, offering new shapes for traditional and unique types of enterprises (Gomes, Santoro, & Silva, 2019). The intersection of digital transformation and innovation management is still in its infancy in terms of research. Digital transformation has the potential to have a profound effect on the innovation process at many phases (Appio et al., 2021). Due to the fact that the convergence between digital transformation and innovation management is complex and multi-dimensional (Broekhuizen et al., 2021). In many firms, digital innovation is about figuring out how to engage employees effectively with technology (Cetindamar, Abedin, & Shirahada, 2021). Through its role in optimism and innovativeness, technology readiness benefits employees by providing them with improved control, flexibility, and efficiency in their job (Parasuraman, 2000). The objective of digital transformation is to leverage innovation in order to not only recreate present assistance in a digital structure, but also to transform that assistance into a more likely structure and more notable extension (Goswami & Upadhyay, 2019). When we consider the scope of digital transformation, we frequently consider the business component with new capabilities, which revolves around fostering the authoritative bounds that should be dexterous, people-centered, and innovative (Goswami & Upadhyay, 2019). Episodic evidence suggests that firms that have successfully implemented digital transformation are more adept at generating revenue from their existing assets (Westerman et al., 2014). Sow & Aborbie (2018) determined that a transformational leadership style was at least partially conducive to the desired outcomes during a digital transformation, and leadership characteristics had a significant impact during a digital transformation. Therefore, the following hypothesis has been put forth:

H3: The digital transformation moderates the relationship between authentic leadership and innovation behavior.

During the COVID-19 pandemic, several company executives expressed concern about the changes associated with moving their firms' daily operations online and giving resources for employees to work from home (Jestine, 2021).

Businesses leverage digital technology to ensure that workers can work comfortably and efficiently from any location (Purba, 2021). However, the introduction of several uncertainties as a result of technology advancements can result in elevated levels of occupational stress. Workplace stress has a direct impact on work engagement and, as a result, jeopardizes organizational effectiveness (Winasis, Wildan, & Sutawidjaya, 2020). Of course, digital transformation can also be beneficial, and businesses can use technology to create new jobs. There are two explanations for this. To begin, it improves engagement and enables people to naturally add value. Second, employees are more likely to value the tangible benefits of digital transformation, which increases work engagement (Syahroni, 2021). If staff are motivated and engaged in the process of system and process adaptation. And it is against this backdrop that the research of work engagement gains significance (Goswami & Upadhyay, 2019). Employee buy-in and a sense of being involved, valued, and becoming an important part of the organization are critical when it comes to digital transformation plans and journeys. Open and transparent communication with employees, as well as the exchange of opinions and thought between management and employees, are critical for employee buy-in and a sense of being involved, valued, and becoming an important part of the organization (Syahroni, 2021). In other words, firms raise employee knowledge of future digital transformation requirements and the importance of completing current duties. Employees are more receptive to the practical benefits of digital transformation, which benefits work engagement. Therefore, the following hypothesis has been put forth:

H4: The digital transformation moderates the relationship between authentic leadership and work engagement (Figure 1).

3. Methods

3.1. Sample and Data Collection

To objectively validate the effects of digital transformation and authentic leadership on employee innovation and engagement, this study performed a survey of Chinese company employees. We obtained data from a sample of 305 Chinese employees in SFPI SMEs of Zhejiang province who work in the information technology, media, service, and manufacturing industries. Among them, 31 are in the IT field, 86 in the media field, 79 in the service field, 16 people in the field of Production, and 83 people in other areas. Between January 3rd and February 20th, 2022, data were collected using an online survey. Due to the constraints of the online survey, only 349 of the 600 potential respondents responded. Due to missing data on 44 surveys, the final sample size was 305 (58.1 percent response rate). Table 1 summarises the responder sample profile. As stated in Table 1, 53.4 percent of respondents were male, around 47.2 percent were between the ages of 25 and 35, and more than 77 percent had earned a university degree. Additionally, approximately 35% have more

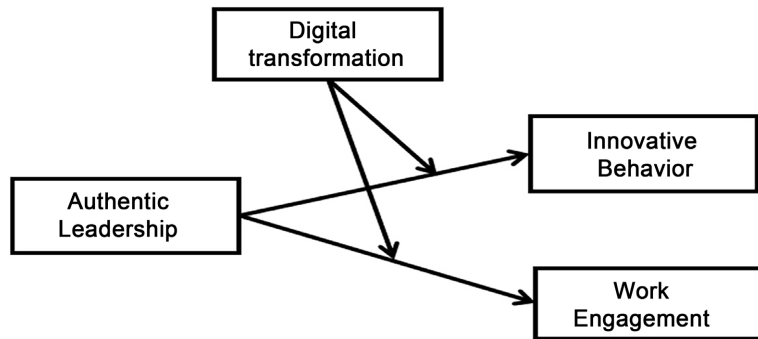


Figure 1. Research model.

Table 1. Sample profile.

	Categories	N	%
Gender	Male	142	46.6
	Female	163	53.4
Age	~25	41	13.4
	25 - 30	78	25.6
	30 - 35	66	21.6
	35 - 40	45	14.8
	40~	75	24.6
Education	High school	7	2.3
	College	38	12.5
	Bachelor	235	77.0
	Master & Doctor	25	8.2
Career (Years)	1 - 3	70	23.0
	3 - 6	76	24.9
	6 - 9	52	17.0
	9~	107	35.1
Industry	IT	31	10.2
	media	86	31.5
	service	79	25.9
	Production	16	5.2
	Other	83	27.2
functional areas	Sales & AS	41	13.4
	HR & HRD	13	4.3
	Financial affairs	27	8.9
	Operation	43	14.1
	Administrative planning	42	13.8
	R & D	59	19.3
	Other	80	26.2

than 9 years of professional experience in their current position.

3.2. Measures

Authentic leadership, developed by Walumbwa et al. (2008) has four dimensions and 16 question items. In this paper, Authentic leadership was measured using eight items taken from Walumbwa et al. (2008), with a 5-point response scale from 1 (strongly disagree) to 5 (strongly agree). A sample item of the scale is “My leader seeks feedback to improve interactions with others.”

Digital transformation was measured using eight items taken from Nwankpa & Roumani (2016), with a 5-point response scale from 1 (strongly disagree) to 5 (strongly agree). A sample item of the scale is “Our firm is driving new business processes built on technologies, such as big data, analytics, cloud, mobile and social media platform”.

Innovative behavior was measured using six items taken from Scott & Bruce (1994), with a 5-point response scale from 1 (strongly disagree) to 5 (strongly agree). A sample item of the scale is “I generate creative ideas at work”.

Work engagement was measured using nine items taken from Schaufeli, Bakker, & Salanova (2006), with a 5-point response scale from 1 (strongly disagree) to 5 (strongly agree). A sample item of the scale is “I am enthusiastic about my job.”

3.3. Measurement Reliability and Validity Assessment

We used an exploratory factor analysis (EFA) followed by a confirmatory factor analysis to determine the measurement’s reliability and validity (CFA). **Table 2** summarises the findings from the exploratory factor analysis. Four factors were identified as a consequence of exploratory factor analysis. Due to the fact that all variables measured had a value of 0.50 or more, the internal consistency required for hypothesis verification was established (generally, when the value is 0.40 or above, it is judged to be significant). Cronbach’s alpha values were calculated to determine the scales’ reliability (authentic leadership = 0.909; digital transformation = 0.908; work engagement = 0.876; and inventive behaviour = 0.894). Cronbach’s alpha scores for each scale exceeded the crucial value of 0.70, suggesting that the questionnaires were highly dependable and could be used in our study.

Additionally, we investigated the construct reliability and validity of our perceptual measures by doing a confirmatory factor analysis on an overall four-component structure. **Table 3** summarises the results of our confirmatory factor analysis. As expected, the model fits the data satisfactorily (CMIN/DF = 1.684, $p < 0.01$; comparative fit index [CFI] = 0.947; Tucker-Lewis index [TLI] = 0.942; incremental fit index [IFI] = 0.947; root mean square error of approximation [RMSEA] = 0.047 0.05). Additionally, after eliminating factors with SMC values less than 0.4 (EE2, EE6, EE7), all remaining factors satisfy the requirements ($p < 0.01$).

Table 2. Results of exploratory factor analysis.

	Varimax rotation loadings ($n = 305$)				Cronbach's Alpha
	Factor 1 (AL)	Factor 2 (DT)	Factor 3 (EE)	Factor 4 (IB)	
AL3	0.778	0.197	0.102	0.183	0.909
AL2	0.750	0.077	0.151	0.161	
AL6	0.748	0.147	0.214	0.165	
AL7	0.728	0.087	0.126	0.260	
AL8	0.721	0.163	0.142	0.076	
AL1	0.702	0.182	0.144	0.140	
AL4	0.697	0.167	0.094	0.264	
AL5	0.696	0.298	0.202	0.162	
DT6	0.042	0.757	0.186	0.144	0.908
DT4	0.125	0.756	0.067	0.088	
DT5	0.173	0.750	0.054	0.127	
DT3	0.199	0.749	0.155	0.094	
DT8	0.165	0.742	0.085	0.196	
DT7	0.202	0.728	0.252	0.071	
DT2	0.150	0.723	0.253	0.151	
DT1	0.171	0.705	0.194	0.047	
WE4	0.183	0.037	0.750	0.106	0.876
WE8	0.022	0.155	0.713	0.181	
WE1	0.074	0.111	0.706	0.125	
WE5	0.094	0.212	0.702	0.095	
WE3	0.155	0.125	0.672	0.196	
WE9	0.116	0.213	0.669	0.126	
WE7	0.191	0.107	0.598	0.172	
WE2	0.186	0.185	0.586	0.103	
WE6	0.137	0.076	0.585	0.259	
IB1	0.162	0.138	0.187	0.799	0.894
IB3	0.250	0.141	0.236	0.732	
IB5	0.226	0.213	0.258	0.715	
IB2	0.377	0.114	0.101	0.707	
IB4	0.183	0.162	0.337	0.695	
IB6	0.194	0.134	0.248	0.688	

Note: DT = digital transformation, AL = authentic leadership, WE = work engagement, IB = innovative behavior, N = 305.

Table 3. Results of confirmatory factor analysis.

Construct and indicators		Estimate		SMC	S.E.	C.R.	P
		B	β				
Digital Transformation	DT8	1	0.738	0.545			
	DT7	1.027	0.765	585	0.078	13.133	***
	DT6	0.983	0.735	540	0.078	12.592	***
	DT5	1.053	0.725	526	0.085	12.417	***
	DT4	1.045	0.704	496	0.087	12.037	***
	DT3	1.045	0.758	574	0.080	13.008	***
	DT2	1.004	0.759	576	0.077	13.028	***
	DT1	0.994	0.700	490	0.083	11.969	***
Authentic Leadership	AL8	1	0.685	469		.	
	AL7	1.095	0.736	542	0.094	11.677	***
	AL6	1.041	0.761	578	0.087	12.024	***
	AL5	0.982	0.750	563	0.083	11.879	***
	AL4	1.027	0.721	520	0.090	11.462	***
	AL3	1.087	0.792	627	0.087	12.466	***
	AL2	1.002	0.712	508	0.088	11.335	***
	AL1	0.962	0.696	484	0.087	11.091	***
Work Engagement	WE1	1	0.669	447			
	WE3	0.957	0.683	466	0.095	10.080	***
	WE4	0.980	0.717	515	0.093	10.491	***
	WE5	0.935	0.695	483	0.091	10.230	***
	WE8	0.958	0.674	454	0.096	9.973	***
	WE9	0.947	0.665	443	0.096	9.869	***
Innovative Behavior	IB1	1	0.774	599			
	IB2	0.964	0.738	544	0.074	13.104	***
	IB3	0.958	0.771	594	0.070	13.775	***
	IB4	0.885	0.756	571	0.066	13.472	***
	IB5	0.890	0.772	595	0.065	13.789	***
	IB6	0.832	0.692	480	0.068	12.193	***

CMIN/DF = 1.684, $p < 0.001$ comparative fit index [CFI] = 0.947, Tucker-Lewis's index [TLI] = 0.942, incremental fit index [IFI] = 0.947, root mean square error of approximation [RMSEA] = 0.47

Note: DT = digital transformation, AL = authentic leadership, WE = work engagement, IB = innovative behavior N = 305, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

All remaining variables had significant correlations. **Table 4** summarizes the mean, standard deviation, and correlation coefficients for the variables. According to these findings, respondents identified the presence of real leadership (mean = 3.18). Work engagement (mean = 3.30) was the second-highest ranked variable overall. Digital transformation received the highest grade (mean = 3.40), followed by innovative behavior (mean = 3.22). As expected, authentic leadership was associated with innovative behavior ($r = 0.560$, $p < 0.01$), work engagement ($r = 0.433$, $p < 0.01$), and digital transformation ($r = 0.451$, $p < 0.01$).

4. Analyses and Results

Hypothesis Testing

The fit of the structural model is $CMIN/DF = 1.611 < 2$, $p < 0.001$, comparative fit index [CFI] = 0.953, Tucker-Lewis's index [TLI] = 0.948, incremental fit index [IFI] = 0.953, root mean square error of approximation [RMSEA] = 0.45, confirming that the model is at a satisfactory level. As a result of hypothesis analysis, it was found that authentic leadership was analyzed to have a positive (+) effect on innovative behavior ($\beta = 0.474$, $t = 7.954$, $p < 0.001$). Hypothesis 1 was supported. Authentic leadership had a positive (+) effect on work engagement. was analyzed to have an effect ($\beta = 0.304$, $t = 4.662$, $p < 0.001$). Therefore, Hypothesis 2 also was supported (**Table 5**).

The results of the tests of hypotheses 3, 4, are presented in **Table 6**. Hypotheses 3, which predicted that digital transformation would moderate the relationship between authentic leadership and innovation behavior, was supported (Step 3, $b = 0.106$, $t = 2.245$, $p < 0.05$). A plot of the interaction (illustrated in **Figure 2**) showed that excluded employees with high levels of digital transformation reported higher levels of innovation behavior than excluded employees

Table 4. Mean, standard deviations and correlations.

	Mean	S.D.	1	2	3	4	5	6	AL	IB	WE	DT
Age	4.29	1.655	1									
Gender	1.53	0.500	-0.261**	1								
Education	2.92	0.568	-0.277**	0.068	1							
Career	3.82	1.559	0.895**	-0.241**	-0.261**	1						
Functional	4.48	2.028	0.115*	-0.081	-0.061	0.076	1					
Industry	3.08	1.365	0.136*	-0.052	0.046	0.138*	0.243**	1				
AL	3.18	0.806	0.025	-0.111	0.053	0.033	0.051	0.081	1			
IB	3.22	0.681	0.035	-0.066	0.040	-0.020	-0.009	-0.026	0.560**	1		
WE	3.30	0.733	0.073	-0.105	0.010	0.028	-0.082	-0.005	0.433**	0.539**	1	
DT	3.40	0.782	0.035	0.003	-0.005	-0.029	0.038	0.050	0.451**	0.417**	0.434**	1

Note: DT = digital transformation, AL = authentic leadership, WE = work engagement, IB = innovative behavior N = 305, * $p \leq 0.05$, ** $p \leq 0.01$.

Table 5. The results of H1 and H2.

	Hypothesis	Estimate		S.E.	C.R.	<i>p</i>
		B	β			
H1	AL→IB	0.474	0.538	0.051	7.954	***
H2	AL→WE	0.281	0.304	0.064	4.622	***

CMIN/DF = 1.611 < 2, $p < 0.001$ comparative fit index [CFI] = 0.953, Tucker-Lewis's index [TLI] = 0.948, incremental fit index [IFI] = 0.953, root mean square error of approximation [RMSEA] = 0.45.

Note: DT= digital transformation, AL = authentic leadership, WE = work engagement, IB = innovative behavior N = 305, *** $p \leq 0.001$.

Table 6. The results of moderating role of digital transformation.

Variables	Innovation behavior				Work engagement				
	β	t	<i>p</i>	VIF	β	t	<i>p</i>	VIF	
		0.088	0.930			0.906	0.366		
Step 1	Age	0.026	0.515	0.607	1.083	0.063	1.173	0.242	1.083
	Gender	0.000	0.007	0.994	1.088	-0.050	-0.932	0.352	1.088
	Functional	-0.041	-0.843	0.400	1.018	-0.115	-2.213	0.028	1.018
	AL (centering)	0.562	11.683***	0.000	1.014	0.431	8.323***	0.000	1.014
			0.372	0.710			1.343	0.180	
Step 2	Age	0.018	0.363	0.717	1.085	0.051	1.000	0.318	1.085
	Gender	-0.013	-0.268	0.789	1.093	-0.070	-1.361	0.175	1.093
	Functional	-0.044	-0.933	0.351	1.018	-0.120	-2.418	0.016	1.018
	AL (centering)	0.467	8.871***	0.000	1.277	0.292	5.264***	0.000	1.277
	DT (centering)	0.207	3.950***	0.000	1.262	0.305	5.540***	0.000	1.262
			0.566	0.572			1.576	0.116	
Step 3	Age	0.019	0.404	0.687	1.085	0.053	1.054	0.293	1.085
	Gender	-0.020	-0.411	0.681	1.098	-0.078	-1.538	0.125	1.098
	Functional	-0.045	-0.961	0.337	1.019	-0.121	-2.467	0.014	1.019
	AL (centering)	0.465	8.874	0.000	1.278	0.288	5.251***	0.000	1.278
	DT (centering)	0.188	3.559	0.000	1.297	0.282	5.092***	0.000	1.297
	AL*DT	0.106	2.245**	0.025	1.044	0.131	2.630**	0.009	1.044
model	R²	ΔR²	F	P	R²	ΔR²	F	P	
1	0.316	0.307	34.661	0.000	0.206	0.195	19.440	0.000	
2	0.350	0.339	32.199	0.000	0.280	0.268	23.228	0.000	
3	0.361	0.348	28.035	0.000	0.296	0.282	20.893	0.000	

Note: DT = digital transformation, AL = authentic leadership, WE = work engagement, IB = innovative behavior N = 305, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

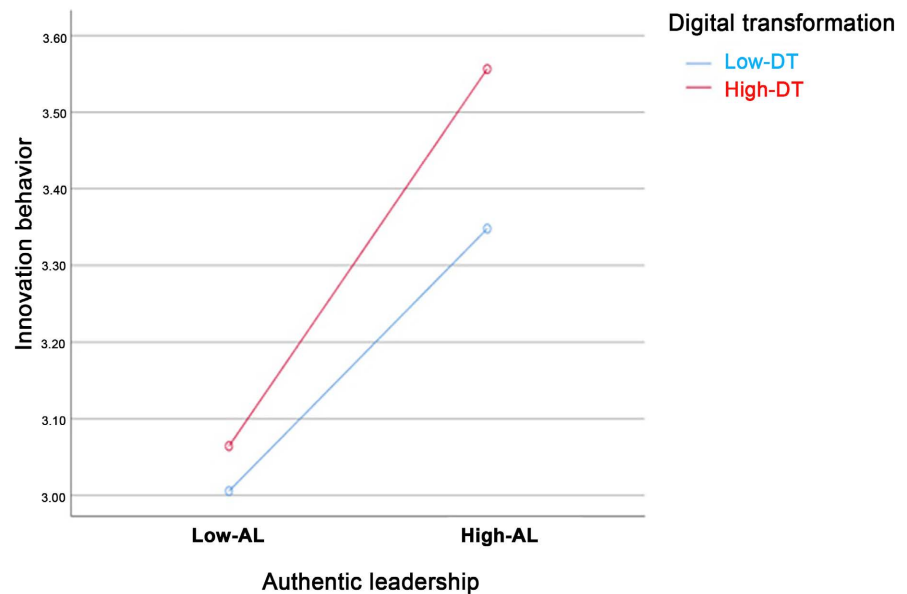


Figure 2. Relationship of authentic leadership to innovation behavior for two levels of digital transformation.

with low digital transformation. Thus, Hypothesis 1 was partially supported. Similarly, Hypotheses 4, which predicted that digital transformation would moderate the relationship between authentic leadership and work engagement, was supported (Step 3, $b = 0.131$, $t = 2.630$, $p < 0.05$). A plot of the interaction (illustrated in **Figure 3**) showed that excluded employees with high levels of digital transformation reported higher levels of work engagement than excluded employees with low digital transformation. Thus, Hypothesis 4 was partially supported.

5. Discussion and Conclusion

5.1. Discussions

This study was conducted to determine the impact of authentic leadership on employee innovation behavior and work engagement. It also aimed to establish the moderator role of digital transformation.

First, we found that authentic leadership has played a vital role in enhancing employees' innovative behaviors. It also has been verified in the research of other scholars (Ribeiro et al., 2019). Second, we also found that authentic leadership positively affects work engagement. Authentic leadership increases followers' hope, trust, and positive emotions, resulting in improved work engagement (Winton, Whittington, & Meskelis, 2022). Third, digital transformation moderates the relationship between authentic leadership and innovation behavior. It means digitization is not merely a context for innovation and entrepreneurship. Increasingly, digital technologies can assume the role of an operant resource and be an active ingredient in fueling innovative initiatives (Nambisan, Wright, & Feldman, 2019). Finally, digital transformation moderates the relationship between

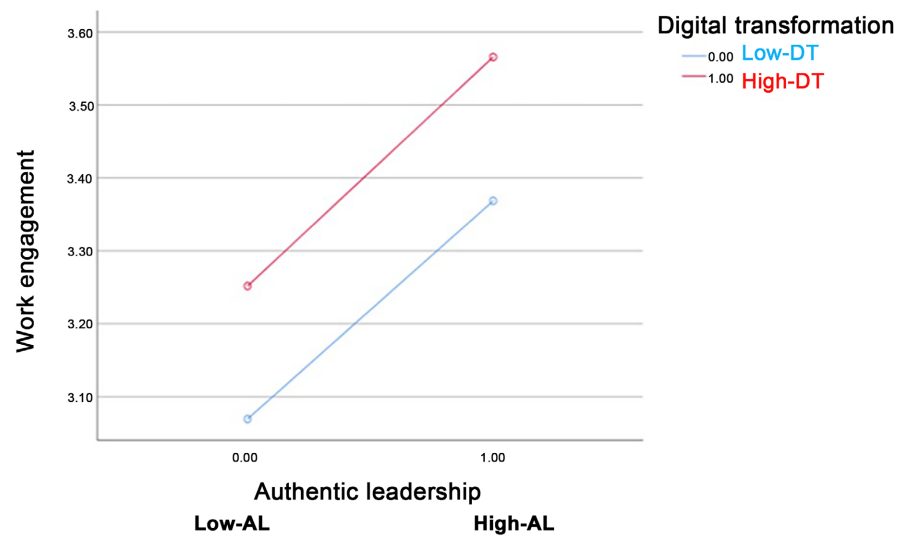


Figure 3. Relationship of authentic leadership to work engagement for two levels of digital transformation.

authentic leadership and work engagement. Although there is no more direct prior research to prove the relationship between digital transformation and employee innovation behavior, some scholars have confirmed that deepening digital transformation is beneficial to improving work engagement (Syahroni, 2021). The findings of this study will provide theoretical support for future scholars to study the relationship between digital transformation and employee innovation behavior and leadership.

While there are many studies exploring the positive effects of true leadership on work engagement and innovative behaviors (Adekanmbi & Ukpere, 2021; Fateh et al., 2021). But there is not much literature examining the actual context of digital transformation, exploring true leadership and employee-perceived digital transformation in both work engagement and innovation. The findings of this paper will have positive academic and theoretical implications for research on leadership and employee behavior in the context of digital transformation.

5.2. Conclusion

We obtained data from Chinese employees in Zhejiang province SRUI Giants SMEs who work for various Chinese enterprises in the information technology, media, service, and manufacturing industries to determine the relationship between digital transformation, authentic leadership, work engagement, and innovative behavior. Calderon-Mafud & Pando-Moreno (2018) study shows that authentic leaders could stimulate the creativity and innovative capacity of the employees by increasing the amount of autonomy that fosters creative freedom in their partners. Higher levels of authentic leadership also report greater work engagement and a more significant labor implication (Bamford, Wong, & Laschinger, 2013). In this study, the findings reveal the growing importance of digital transformation in the fabric of our economy. The impact of digital transfor-

mation and the epidemic has caused many employees to shift from on-site work to online and off-the-job work. Research has proved that better working methods and modes in digital transformation can allow employees to use their resources flexibly to show more positive professionalism and innovative behaviors.

The research results will enlighten enterprises in the digital transformation era and the post-corona era's background. First, companies should think about why they should do digital transformation. In the tide of digital transformation, companies that remain unchanged will face being abandoned, surpassed by competitors, marginalized by the market, and eventually eliminated. On the other hand, digital transformation can capture new market opportunities, try new business models, and help companies prepare for competition in future markets. Secondly, the core competitiveness of enterprises in the digital economy era has changed from the traditional manufacturing capabilities of the past to digital capabilities and innovation capabilities. Enterprises must be able to carry out technological research and innovation and accelerate the transformation of industrial production to intelligent, flexible, and service-oriented. In addition, enterprises must have the ability to cooperate across borders and promote the innovation system from a chain-based value chain to a flexible, real-time interaction and multi-party participation. Authentic leadership characteristics of authentic leaders can also help employees adapt to the new work mode as soon as possible, allow employees to improve their self-confidence, and continue to innovate their practices.

5.3. Limitations and Future Research

The study also had several limitations. First, in terms of data surveys, we selected employees in various fields to conduct online surveys, and the number of valid samples did not meet expectations. Due to the limitations of the online survey, only 349 of 600 potential respondents responded. Therefore, the final effective sample size is 305. Our expected adequate sample size is 450, and if the IT field can account for more than 50% of the sample number, it will better confirm this research's importance in the leading digital transformation field. In the follow-up research, we will expand the sample's scope and explore the relationship between digital HR, digital transformation, and employee behavior. The questionnaire design about digital transformation is the perceived degree of employees to the digital transformation of the company (department) may deviate from the digital transformation situation of the actual company. In later research, we will continue to increase the number of valid questionnaires to improve the reliability and validity of the paper. Not only that, but we will also continue to add some employee psychological variables in follow-up research to explore the impact of leadership and digital transformation on employee psychology. For example, how does digital transformation affect employee psychological safety and work stress? What is the mediating effect of psychological safety between authentic leader-

ship and employee innovation behavior?

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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