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Research on the Activation Path of Employees' Openness to Digital Transformation: A New Impetus to Realize Enterprises' Digital Transformation for Sustainable Development

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Abstract: Digital transformation is an important strategic decision for the sustainable development of enterprises, which helps enterprises achieve sustainable performance, sustainable management, and even sustainable business models. While there have been a number of useful studies discussing the impetus of digital transformation, most of them have neglected the role from employees, especially their attitudes and perceptions towards transformation. Focusing on employees' openness to digital transformation, we selected six antecedents to construct a configuration model, using fsQCA and NCA methods to explore the complex causal relationship between each antecedent and openness to digital transformation. This aims to derive the activation paths for employees' openness to digital transformation, so as to help the enterprises' digital transformation and further achieve sustainable development. Through the data analysis of 462 employees of Chinese enterprises, the following conclusions are drawn: firstly, single antecedents are not necessary conditions for high/non-high digital transformation openness activation; secondly, there are three configurations associated with the high openness activation of digital transformation: a comprehensive collaboration type under internal environment dominance (S1a + S1b), the consideration of both an internal and external environment type under mindfulness characteristics' dominance (S2), and a mindful substitution type under internal environment dominance (S3); and finally, there are four configurations associated with non-high digital transformation openness activation and an asymmetric relationship exists with the high digital transformation openness activation path.

Keywords: openness to digital transformation; individual–environment interaction theory; configuration model; NCA; fsQCA; sustainable development

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1. Introduction

According to China's "14th Five-Year Plan for the Development of Digital Economy", the digital economy has emerged as a primary economic form following agricultural and industrial economies. Digital transformation, driven by the dissemination and utilization of digital technology, is a disruptive force that continuously shapes organizations and has become a core mechanism determining enterprise survival and sustainable development [1,2]. While empowering enterprises and providing new competitive advantages [3], digital transformation also presents various management challenges. Previous studies have indicated that although technologies like artificial intelligence, blockchain, cloud computing, and big data (ABCD) provide essential conditions for digital transformation, they often overlook the crucial role of soft factors such as employees' willingness to change [4]. Consequently, this leads to significant subjective resistance during the process of digital transformation and hinders smooth evolution in this stage. Particularly in the initial phase of digital transformation, employees' cognition and attitude towards change significantly influence the adoption of new technologies and the implementation of change measures [5]. Scholars have emphasized that without active employee engagement in the change process, achieving successful outcomes becomes exceedingly difficult [6]. Among these factors affecting

efficiency in transformational efforts is employees' openness to digital transformation—reflecting individuals' psychological readiness to accept change and their enthusiasm for participating in it—which serves as an important internal driver influencing transformative effectiveness. Therefore, it is necessary to explore the activation path of digital transformation openness, so as to help enterprises promote digital transformation faster and better and achieve sustainable development and further achieve sustainable development.

Unfortunately, despite the self-evident importance of employees in the process of digital transformation, the current research fails to adequately reflect the driving effect of individual attitudes on this transformation. This is evident from the fact that many scholars still focus their research on the driving mechanisms of transformation policies, the industrial environment, or technological factors. For instance, at a macro level, Zhu et al. argue from a policy environment perspective that when policy documents are issued, it signifies that enterprise digital transformation has gained national attention and reduces resistance while accelerating its pace [7]. At a meso level, Song et al., based on isomorphic effects and industry digitalization levels, demonstrate how improving industry digitalization promotes new competition rules and necessitates enterprises to develop corresponding digital capabilities for accessing high-quality resources and customers [8]. At a micro level, Fitzgerald et al. and Correani et al. emphasize from a digital infrastructure standpoint that mature technologies like artificial intelligence, big data, and cloud computing provide favorable conditions for enterprises' digital transformation [9,10]. Although these studies have significantly explored facilitating enterprise digital transformation to a large extent, they overlook discussions regarding individual attitudes towards such transformations at the micro level. This finding aligns with Reis and Melao's meta-analysis of the literature related to enterprise digital transformation [11]. However, it is encouraging that a few studies have recognized the significance of employee cognition and attitude in relation to digital transformation. For example, Li and Zhang assert that enterprises should prioritize fostering an organizational culture conducive to embracing change [12]. Narbariya et al. believe that employee attitude is one of the key factors affecting the digital transformation of enterprises [13].

On the whole, consistent with the views of the above scholars, this paper also agrees that employees' openness to digital transformation plays an important role in enterprises' digital transformation. Therefore, the main goal of this paper is to explore the path of the openness activation of employees' digital transformation. Compared with previous studies, the significant difference of this paper lies in the following: Firstly, the current research primarily focuses on macro- and meso-level factors influencing digital transformation while neglecting the micro-level and disregarding the role and impact of employees [14]. Consequently, this paper concentrates on investigating the antecedents that influence employees' attitudes towards digital transformation and underscores the crucial micro-level role played by enterprises in attending to employees' attitudes during this process. Secondly, although a few studies have examined the impact of employees' attitudes on digital transformation from a micro perspective, they have not fully considered the complexity of attitudes and behaviors or explored their interaction with environmental factors [15]. The individual–environment interaction theory posits that employees and their environment are integrated systems with reciprocal effects; thus employee characteristics and environmental factors cannot independently explain their behaviors and attitudes, but rather depend on their interplay [16]. Therefore, this paper aims to enhance our understanding of employee openness in digital transformation based on the individual–environment interaction theory. Thirdly, regarding research methods, existing studies predominantly employ traditional regression models or qualitative research methods that focus solely on net effects of one or more variables without considering interactions between different levels of factors or exploring diverse pathways leading to outcome variables. Given the consideration of this research shortage, this paper comprehensively employs configuration analysis thinking by utilizing the necessary condition analysis (NCA) method as well as the fuzzy set qualitative

comparative analysis (fsQCA) method to investigate how antecedent–condition couplings influence employee openness towards digital transformation.

The marginal contribution of this paper primarily lies in the following three aspects. Firstly, at the micro level, drawing upon the individual–environment interaction theory, this study integrates six antecedent conditions—mindfulness, communication quality, relationship quality, industry dynamics, family support, and transformational leadership—to explore the activation path of employees' openness to digital transformation. This novel approach offers a fresh perspective for enhancing enterprises' digital transformation efforts. Secondly, it broadens the application scope of person–environment interaction theory by applying its explanatory framework to enterprise digital transformations and examining how employees' cognitive attitudes react throughout this process. Thirdly, departing from conventional empirical research on employees' attitudes towards digital transformation that predominantly employs traditional regression methods, this paper introduces new testing methodologies based on NCA and fsQCA approaches. These innovative methods contribute to a deeper understanding of the intricate influencing mechanisms underlying employees' positive attitude towards transformational change.

The rest of this paper is presented as follows. Section 2 is the Theoretical Review and Research Framework. Section 3 introduces the Research Methodology, Samples and Data, variable measurement, and test. Section 4 presents the empirical analysis and results. Section 5 is the Conclusion and Discussion.

2. Theoretical Review and Research Framework

2.1. Openness to Digital Transformation

Miller et al. coined the term "openness to change" in their study on employees' attitudes towards planned changes in an insurance company, referring to the emotional state of those actively responding to organizational changes [17]. According to Miller et al., openness to change is primarily manifested through two aspects: first, the willingness to support change; second, the optimistic expectation of its outcome. Chinese scholars have further defined this concept by emphasizing that openness to change reflects individuals' stable emotional attitude and experience towards organizational changes, as well as their acceptance of such changes [18]. The existing literature on antecedent variables of openness to change mainly focuses on individual psychological states and job characteristics. Specifically, individual psychological state factors include a negative impact of job insecurity and a positive influence of individual change self-efficacy [19,20]. Job characteristic factors include improved openness resulting from high-quality information and the effect of democratic participation in influencing individuals' openness towards change [17,20]. With the emergence of positive psychology and increasing uncertainty within internal and external organizational environments, scholars have paid more attention to the positive utility of openness to change. A higher level of openness is associated with increased team collaboration and helps reduce potential heterogeneous situations caused by resistance such as withdrawal behavior or work deviation.

Under the dividend of the digital economy, most enterprises or organizations regard digital transformation as their top-priority strategic task [21]. As a system of engineering that combines top-down and bottom-up approaches, employees are required to participate and recognize the necessity and importance of digital transformation. Therefore, the openness to change has been given corresponding contemporary significance—the openness to digital transformation. However, upon reviewing the relevant literature, it is evident that few scholars have conducted in-depth discussions and research on the concept and essence of employees' openness towards digital transformation. Based on existing research findings, this paper posits that employee openness in digital transformation refers to a positive psychological inclination and optimistic expectation level among employees who willingly adapt their inherent mental models by embracing an organization's digital transformation plan along with its accompanying reform activities after carefully weighing the pros and cons, while making self-adjustments.

2.2. Individual–Environment Interaction Theory

The theory of individual–environment interactions serves as the theoretical foundation for this paper, providing a systematic framework for explaining the formation and development of employees' behaviors and attitudes. An interaction refers to the "chemical effect" generated by the interdependence of two or more factors, which can result in synergistic effects or antagonistic effects. Synergy occurs when multiple factors jointly contribute to explaining a model, resulting in a greater total effect than that of each factor alone. Antagonistic effects occur when multiple factors jointly contribute to an explanatory model but their influences oppose or offset each other, resulting in a total effect less than that of each factor alone. In the employee attitude and behavior research field, Jacobson et al. demonstrated, from the perspective of a person–environment interaction, that counterproductive work behavior norms are more influential among individuals who are high in their need to belong to social groups [22]. Norton et al. regarded the interaction between the person and environment as a main theoretical framework to explain the motivation of employee green behavior [23]. Liu et al., based on the perspective of the individual–environment interaction, investigated how individual characteristics and a working environment impact low-frequency safety violations among employees [24]. Based on the perspective of the interaction between individuals and the environment, Wang et al. explored how employees' competitive attitudes and behaviors are jointly affected by personal traits and the team atmosphere [25]. Hence, it is evident that understanding the interactive mechanism between individuals and their environment can better capture situational complexity. Given our research design and expected marginal contribution, we will primarily focus on exploring synergy paths for theoretical derivation and model construction.

2.3. Research Framework

The openness to digital transformation is influenced by various factors as a comprehensive response to employees' emotional attitude changes during the early stages of organizational digital transformation. Although research based on the theory of the individual–environment interaction can effectively enhance the explanatory power of outcome variables (openness to digital transformation), it may make the selection of possible antecedent conditions that may have a more reasonable impact and demonstrate a certain degree of internal logic. However, upon reviewing the literature, it becomes apparent that there are numerous relevant antecedents, making it impractical to consider all variables. However, previous studies provide great help for our selection of antecedent conditions. Based on divergent research perspectives, scholars have primarily focused on exploring the influence of individual characteristic factors in terms of individual factors [26,27]. Environmental factors can be categorized as internal environmental factors and external environmental factors within an organization. Moreover, it is worth noting that leadership style has been extensively examined as a distinctive environmental variable [28], with numerous empirical studies demonstrating a significant relationship between leadership factors and employees' attitudes towards change resistance and support for change [18,29]. Hence, it is both reasonable and imperative to analyze leadership factors independently from environmental influences.

Based on this, this paper takes the suggestions of Zhang and Du [30], integrating theoretical deduction and literature induction. It systematically examines mindfulness from the perspective of "individual factors", organizational communication quality and organizational relationship quality from the viewpoint of "internal organizational environmental factors," and industry dynamics and family support from the standpoint of "external organizational environmental factors". These elements collectively constitute the comprehensive framework of "environmental factors". Additionally, transformational leadership is considered as a crucial factor in this study from the perspective of "leadership factors". The internal logic behind these six antecedent conditions can be observed in the following aspects. Firstly, as digital transformation is considered an organizational change [31], the selection of antecedent conditions within the transformation horizon can

more effectively elucidate employees' emotional shifts in the early stages of digital transformation. Mindfulness, communication quality, relationship quality, industry dynamics, family support, and transformational leadership have all been extensively investigated in the realm of organizational change research. Secondly, mindfulness, as a positive trait that enhances individuals' attention and cognition towards their current experiences or situations [32], exerts a significant moderating effect on employees' encoding and decoding processes, as well as the influence of other factors during the initiation stage of organizational reform [33]. Thirdly, when considering environmental factors, it is crucial to not only focus on internal aspects of the organization, but also take into account external environmental considerations. In summary, these six antecedents are closely interconnected under the transformative nature of digital transformation and collectively contribute to explaining employees' activation towards openness in digital transformation.

2.4. Model Construction

2.4.1. Individual Factors and Openness to Digital Transformation

Mindfulness (MF). Firstly, mindfulness plays a pivotal role in enabling employees to approach digital transformation objectively and critically, fostering a state of serene acceptance. Moreover, mindfulness empowers individuals to focus on the present reality rather than excessively dwelling on the past or fixating on the future, facilitating their departure from ingrained modes of thinking and working. This enables employees to embrace digital transformation with an open mind without harboring unrealistic expectations for its benefits. Additionally, mindfulness equips employees with the ability to promptly adjust their emotions and maintain a positive attitude even when faced with setbacks and failures during the process of digital transformation. Ultimately, cultivating mindfulness leads to heightened work engagement among individuals [34], instilling them with confidence in their competence for tasks related to digital transformation.

2.4.2. Environmental Factors and Openness to Digital Transformation

Communication quality. The quality of communication is pivotal in the context of digital transformation as it profoundly impacts employees at all organizational levels and fundamentally reshapes their cognitive processes and operational procedures [35]. High-quality organizational communication entails effectively transmitting information, thoughts, or emotions in a manner that enables recipients to easily acquire and accurately comprehend the conveyed message [36]. This effective communication approach can effectively alleviate employee concerns regarding the uncertainties associated with digital transformation, enhance their understanding of this process, and bolster their confidence in its successful implementation. Moreover, high-quality organizational communication serves as a vital coordination mechanism that facilitates seamless information sharing and integration between organizations and individuals. It deepens employees' sense of alignment with organizational goals while stimulating their responsibility towards driving forward digital transformation initiatives. Lastly, given the potential risks of distortion during top-down transmission related to digital transformation information dissemination, high-quality organizational communication plays a pivotal role in enhancing employees' clarity regarding implementation details. By reducing instances of information distortion and entropy increase, it fosters greater willingness among employees to actively participate in the journey towards digital transformation.

Relationship quality. Interpersonal relationships significantly shape individuals' positive attitudes [37]. In the context of digital transformation, employees' openness cannot be separated from the mutual influence exerted by their colleagues in the workplace. Firstly, organizations with strong membership relations tend to demonstrate greater innovation and adaptability, embracing new challenges, experimenting with novel working methods, and acquiring new skills [38]. This fosters enhanced digital literacy among individuals and encourages proactive engagement in response to digital transformation. Secondly, fostering strong relationships enhances members' sense of organizational identity and be-

longingness, facilitating their acceptance and alignment with the organization's strategies for digital transformation. Lastly, cultivating positive relationships among team members facilitates effective communication, trust-building, and cooperation while reducing anxiety levels—ultimately creating a supportive environment.

Industry dynamics. Industry dynamics drive organizational change through rapid technological iteration and changing demands. According to institutional theory, organizations in dynamic environments possess a certain degree of change-seeking thinking and adaptability due to industry characteristics. Following conventions and adhering to conservative styles is often not the best decision-making guide for organizations. This requires employees to constantly adjust their cognition to match the rapidly changing work environment and requirements. As the compass for enterprise digital transformation becomes clearer, enterprises must fully mobilize employees' responsiveness and require them to be timely and realistic, meaning they need to recognize the necessity of digital transformation and enhance their digital thinking accordingly.

Family support. The work–family gain theory emphasizes that the resources individuals acquire from their family experiences can be transferred, applied, and enhanced to positively impact their performance in the workplace [39]. The support and care provided by the family effectively alleviate the internal conflicts individuals face when dealing with digital transformation pressures, enhance employees' perception of family support resources, and improve their self-efficacy. Consequently, these transformed family support resources become valuable assets in the workplace to adapt to changes. Additionally, as a protective factor, family support serves as a strong foundation for individuals to confront new situations, cope with emerging technologies, and acquire new skills [40]. Lastly, with the implementation of intelligent robots and algorithms comes an inevitable increase in the digital distance between employees and organizations, thus highlighting the need for humanized management methods [41].

2.4.3. Leadership Factors and Openness to Digital Transformation

Transformational leadership. In the process of promoting organizational change, transformational leadership places great emphasis on value construction [42]. Chen et al. categorized the essence of transformational leadership into two aspects: leadership charisma and personal charm [43]. Through structural and content analysis, these two aspects of transformational leadership have a positive impact on fostering openness towards digital transformation. On the one hand, charismatic leadership strengthens employees' psychological contract, enhances organizational commitment, and facilitates employee recognition and adherence to decisions made by leaders. On the other hand, personal charm enables leaders to inspire employees to understand that the path towards digital transformation may be challenging, but holds a promising future, making it easier for them to comprehend and support.

To summarize, this paper presents a multi-level configuration model illustrating the influencing factors on employees' openness to digital transformation, as depicted in Figure 1.

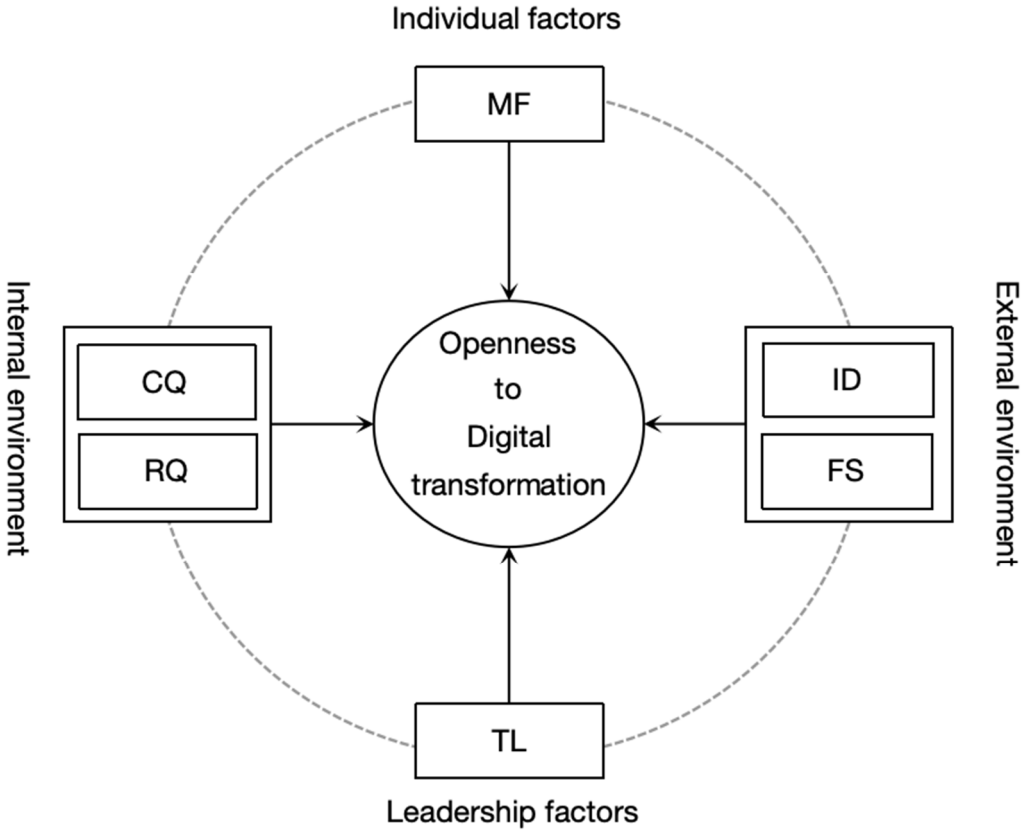

Figure 1. Research model.

3. Research Design

3.1. Research Methodology

Qualitative Comparative Analysis (QCA) is a research method grounded in Boolean algebra and set theory, which combines both case-oriented and variable-oriented approaches. It was introduced to the social sciences by Ragin in 1987. QCA technology exhibits characteristics of moderate universality, replicability, and transparency, encompassing a clear set (csQCA), multi-valued set (mvQCA), and fuzzy set (fsQCA). The main steps in the application of fsQCA are as follows: First, the research problem and theoretical framework are defined. This corresponds to the first half of this article. The purpose is to select a suitable research question and construct a reasonable group model. Second, variable definition and data collection, corresponding to Sections 3.2 and 3.3 of this paper. The purpose is to ensure that the selected cases are representative. Third, data calibration, which corresponds to Section 4.1 of this paper. The purpose is to transform the conditions and results of each case into fuzzy set data. Fourth, necessity analysis, which corresponds to Section 4.2 of this paper. The purpose is to test whether each antecedent condition is necessary for the outcome. Fifth, setting up analysis parameters and running fsQCA analysis, corresponding to Section 4.3 of this paper. The purpose is to derive the grouping paths. Sixth, the results and interpretations are presenting, corresponding to Sections 4.3.1 and 4.3.2 of this paper. The purpose is to explain the number of combinations in which the outcome variable will occur. Seventh, robustness test, corresponding to Section 4.4 of this paper. The purpose is to ensure the reliability of the findings.

However, the QCA method solely allows for the qualitative identification of whether an antecedent condition is necessary for an outcome condition without providing detailed insights into the extent to which antecedents are required for a specific outcome. To address this limitation, Dul et al. proposed the Necessary Condition Analysis (NCA) method in 2020 as an effective remedy for this deficiency. This paper primarily selects the combination of NCA and fsQCA for the following reasons. Firstly, NCA compensates

for the limitation of fsQCA in only being able to qualitatively test necessary conditions without providing detailed explanations on the extent to which antecedents are required for a specific outcome [44]. Secondly, fsQCA is employed to examine the robustness of necessity analysis results due to its holistic perspective that addresses causal complexity questions such as identifying configurations of conditional elements that lead to expected outcomes or their absence. Thirdly, fsQCA combines qualitative and quantitative analysis advantages while avoiding drawbacks like poor external validity in qualitative analysis and insufficient depth in quantitative analysis. Lastly, unlike csQCA and mvQCA which cannot handle continuous variables, fsQCA can effectively address issues related to degree changes and partial membership, thereby enabling the identification of subtle influences exerted by continuous variables at varying degrees.

3.2. Samples and Data

This paper mainly collects data based on questionnaire survey. Since the research topic is digital transformation, according to the 2023 China Digital City Competitiveness Research Report issued by the China Electronics Information Industry Development Research Institute, we comprehensively select enterprise employees in Beijing, Shanghai, Chengdu, and other relatively developed areas with a digital economy as the research object, and the industry fields involve the Internet, education, traditional manufacturing, new energy, etc. The research period spans from June to August 2023 and is divided into two stages: pre-research and formal research. During the pre-survey phase, the research team elucidated the survey's content and significance to sample enterprises via acquaintance networks and field visits. A limited number of questionnaires were distributed during this stage while measurement items were refined based on actual feedback to formulate a comprehensive survey questionnaire. In the formal investigation stage, considering feasibility, online platforms served as the primary means of conducting research, with offline methods acting as auxiliary support. Online research relied heavily on third-party network platforms for targeted delivery to a sample database that met the research design requirements in order to enhance data source reliability. Offline surveys were administered by engaging acquaintances or other means of payment to invite in-service employees for participation. A total of 600 questionnaires were distributed resulting in 462 valid responses after eliminating invalid submissions, such as those with missing items or exhibiting strong regularity, thus yielding an effective recovery rate of 77%. Table 1 presents the basic information regarding the sampled objects.

Table 1. Sample basic information.

Variable	Types	Simple Size	Percentage (%)
Gender	Male	255	55.19
	Female	207	44.81
Age	18 to 25 years old	37	8.01
	26 to 35 years old	199	43.07
	36 to 45 years old	180	38.96
	Aged 46 and above	46	9.96
Education background	High school and below	46	9.96
	Junior college	138	29.87
	Undergraduate degree	185	40.04
	Master and Above	93	20.13
Years of service	Less than 3 years	162	35.06
	3 to 5 years	185	40.04
	6 to 10 years	92	19.92
	10 years and above	23	4.98

Notes: N = 462.

3.3. Measurement of Variables

Mindfulness (MF). Referring to the scale developed by Brown and Rya [45], five items are designed, including "I frequently engage in activities without mindful attention" and "I often find myself dwelling on the past or fantasizing about the future".

Communication quality (CQ). Referring to the scale developed by Miller et al. [17], four items are designed, including "The organization effectively communicates relevant work-related information in a timely manner" and "The information provided by the organization adequately addresses my work-related concerns".

Relationship quality (RQ). Referring to the team member relationship dimension in the scale developed by Tjosvold et al. [46], there are four items, including "Team members maintain a highly harmonious relationship" and "There is a strong alignment between team members' personalities", which includes two reverse questions.

Industry dynamics (ID). Referring to Yao et al.'s revised scale [47], it includes five items such as "The industry's technology undergoes rapid changes where our enterprise operates" and "Competitors' behavior within our industry changes rapidly".

Family support (FS). The adopted scale developed by Baruch-Feldman et al. [48] includes four items such as "My family demonstrates concern for my emotional well-being regarding work" and "When encountering work-related issues, I can openly discuss them with my family".

Transformational leadership (TL). The adopted scale revised by Chen et al. [43], based on Chinese context consists of eight items such as "My leader inspires everyone with a compelling vision for the future" and "My leader instills a sense of purpose among all individuals".

Openness to digital transformation (ODT). The compiled scale by Axtell et al. [49] focuses on employees' attitudes towards technology advancements and changes in working practices, aligning more closely with this paper's context; it comprises four items such as "I embrace new technological introductions" and "I welcome novel working methods within the organization".

3.4. Test of Variables

The reliability and validity of the data were assessed using SPSS 26.0, with the results presented in Table 2. The minimum factor loading for the antecedent measurement items was found to be 0.733, surpassing the evaluation standard. Additionally, the Cronbach's α coefficient of the scale exceeded the threshold of 0.7, while both combined reliability and average variance extraction values surpassed the test standards of 0.7 and 0.5, respectively. These findings indicate that the data exhibit good reliability and validity, rendering them suitable for subsequent analyses.

Table 2. Reliability and validity test.

Antecedent Condition	Minimum Factor Loading Coefficient	Cronbach's α	CR	AVE
MF	0.753	0.881	0.877	0.588
CQ	0.747	0.858	0.845	0.577
RQ	0.763	0.865	0.860	0.606
ID	0.760	0.889	0.883	0.602
FS	0.751	0.867	0.843	0.574
TL	0.733	0.923	0.916	0.577
ODT	0.751	0.875	0.858	0.602

Notes: MF = mindfulness, CQ = communication quality, RQ = relationship quality, ID = industry dynamics, FS = family support, TL = transformational leadership, ODT = openness to digital transformation. Same as below.

Furthermore, Harman's single factor test and ULMC method were employed to examine the presence of common method bias. The results of the exploratory factor analysis revealed that the unrotated first principal component accounted for 34.70%, which falls below the 40% threshold set for testing purposes. To further validate the existence of common method bias, AMOS 24.0 was utilized, and Table 3 presents the obtained results.

All indicators of the seven-factor model met the required criteria (χ^2/df = 1.055, <3; RMSEA = 0.011, <0.05; TLI and CFI were 0.912 and 0.961, respectively), indicating a superior fit compared to alternative models under consideration. Additionally, when incorporating common method factors into an eight-factor model based on the seven-factor model, there was no significant improvement in the fit indices (RMSEA decreased by only 0.002 while TLI and CFI increased by merely 0.007 and 0.006, respectively; all changes were less than 0.03). Therefore, it can be concluded that there is no substantial evidence supporting the presence of serious common method bias.

Table 3. Confirmatory factor analysis.

Model Test	χ^2	df	$\Delta\chi^2$ (Δdf)	RMSEA	TLI	CFI
Eight-factor (Seven-factor, Ulmc-factor)	489.154	472	—	0.009	0.919	0.967
Seven-factor (MF, CQ, RQ, ID, FS, TL, ODT)	533.928	506	—	0.011	0.912	0.961
Five-factor (MF, CQ + RQ, ID + FS, TL, ODT)	1772.826	517	1238.898 (11) ***	0.073	0.846	0.858
Four-factor (MF, CQ + RQ + ID + FS, TL, ODT)	2178.704	521	1644.776 (4) ***	0.083	0.797	0.811
Two-factor (MF + CQ + RQ + ID + FS + TL, ODT)	3946.074	526	3412.146 (5) ***	0.119	0.587	0.613
One-factor (MF + CQ + RQ + ID + FS + TL + ODT)	4459.801	527	3925.873 (1) ***	0.127	0.526	0.554

Notes: *** $p < 0.001$.

4. Results

4.1. Calibration of Data

The conversion of raw data into ensemble membership scores is an essential prerequisite for QCA analysis, as Boolean operations cannot be performed on uncalibrated data. Data calibration involves determining three critical values: full membership, the crossing point, and full non-membership, to ensure that the calibrated set falls within the range of 0 to 1. In QCA, data calibration primarily encompasses two methods: the direct calibration method and indirect calibration method. The direct calibration method utilizes logical functions to transform the original variables by assigning specific membership values based on qualitative anchor points such as complete membership, the crossing point, and complete non-membership. On the other hand, the indirect calibration method involves dividing groups into multiple levels of membership and assigning different scores accordingly, subsequently optimizing preliminary scores based on distance scale data in order to obtain final membership scores. Among these methods mentioned above, the direct calibration approach is commonly employed.

The direct calibration method is employed in this paper to transform the conditioning and outcome variables into sets. In cases where external marginalization and theory are lacking, it is also a viable approach to utilize the characteristics of research samples for calibration, as long as the selection of qualitative thresholds aligns with relevant theoretical and practical support. Furthermore, considering that questionnaire data often exhibit agglomeration tendencies, it is inappropriate to simply designate the maximum, middle, and minimum values of a five-point scale as the anchor points. Therefore, following Fiss's study [50], we employ the 75%, 50%, and 25% quantiles of the sample data to classify the full affiliation, crossing point, and complete non-affiliation as anchor points.

4.2. Necessary Conditions Analysis

If an antecedent condition consistently exists when an outcome occurs, it can be determined as a necessary condition for the outcome. A single necessary condition is considered to encompass all possible results. Including the necessary condition in the truth table analysis allows its exclusion from the solution of the "logical remainder", thus requiring detection prior to configuration analysis. Tables 4 and 5, respectively, present the necessity analysis and bottleneck level analysis of the NCA method, while Table 6 illustrates the necessity analysis of the fsQCA method.

Table 4. Necessity analysis based on NCA.

Antecedent Condition	Approach	Accuracy	Upper Limit Area	Scope	Effect Size (d)	*p* Value
MF	CR	100%	0.000	1	0.000	1.000
	CE	100%	0.000	1	0.000	1.000
CQ	CR	100%	0.000	1	0.000	1.000
	CE	100%	0.000	1	0.000	1.000
RQ	CR	99.6%	0.000	1	0.000	0.024
	CE	100%	0.000	1	0.000	0.024
ID	CR	100%	0.001	1	0.001	0.000
	CE	100%	0.003	1	0.003	0.000
FS	CR	99.4%	0.000	1	0.000	0.000
	CE	100%	0.001	1	0.001	0.000
TL	CR	100%	0.000	1	0.000	0.000
	CE	100%	0.000	1	0.000	0.000

Notes: CR refers to ceiling regression and CE refers to ceiling envelopment. CR is apt for continuous variables, aligning with the data characteristics in this paper. CE is well-suited for variables featuring less than five categories. Both are applied in this research to ensure a comprehensive comparison of result robustness. The *p* value was obtained by a permutation test with a re-sample count of 10,000 in the NCA.

Table 5. Analysis of bottleneck level (%) based on NCA.

ODT	MF	CQ	RQ	ID	FS	TL
0	NN	NN	NN	NN	NN	NN
10	NN	NN	NN	NN	NN	NN
20	NN	NN	NN	NN	NN	NN
30	NN	NN	NN	NN	NN	NN
40	NN	NN	NN	NN	NN	NN
50	NN	NN	NN	NN	NN	NN
60	NN	NN	NN	NN	NN	NN
70	NN	NN	NN	NN	NN	NN
80	NN	NN	NN	0.3	NN	NN
90	NN	NN	NN	0.6	NN	NN
100	NN	NN	4.8	1	11.7	3

Notes: CR method; NN stands for "unnecessary".

Table 6. Necessary condition analysis based on fsQCA.

Antecedent Condition	High ODT		Non-High ODT	
	Consistency	Coverage	Consistency	Coverage
MF	0.687	0.647	0.437	0.430
~MF	0.395	0.402	0.641	0.682
CQ	0.663	0.649	0.428	0.437
~CQ	0.425	0.415	0.657	0.671
RQ	0.637	0.631	0.441	0.458
~RQ	0.453	0.437	0.644	0.649
ID	0.670	0.614	0.486	0.465
~ID	0.416	0.437	0.597	0.654
FS	0.684	0.659	0.424	0.427
~FS	0.405	0.402	0.661	0.686
TL	0.661	0.642	0.428	0.434
~TL	0.418	0.411	0.648	0.666

Notes: the notation "~" means the absence of the variable.

The NCA not only determines the necessity of a specific condition for an outcome, but also conducts bottleneck-level analysis to assess the effect size and minimum threshold required for that condition to produce the desired outcome. Table 4 reveals that none of the antecedent conditions simultaneously meet both the criteria of an effect size greater than 0.1 and statistical significance ($p < 0.05$). This suggests that these conditions alone do not constitute a necessary requirement for achieving digital transformation openness.

The bottleneck-level analysis results (Table 5) simultaneously indicate that in order to achieve a complete digital transformation, a relationship quality level of 4.8%, an industry dynamics level of 1%, a family support level of 11.7%, and a transformational leadership level of 3% are required. However, no bottleneck levels exist in the other two conditions.

The necessity analysis in this study employs fsQCA. As shown in Table 6, the consistency of each condition, whether it is "high openness of digital transformation" or "non-high openness of digital transformation", is observed to be below 0.9.

4.3. Configuration Analysis

The fsQCA 3.0 software is utilized for conducting configuration research on "high openness to digital transformation" and "non-high openness to digital transformation". Considering the extensive number of cases, following Ragin's recommendation [51], the frequency threshold is set at 1.5% of the total case count, while maintaining the original consistency threshold at 0.8. Additionally, the outcome variable is recoded based on the PRI consistency threshold: if the PRI consistency exceeds 0.7, it retains a value of 1; otherwise, it is changed to zero accordingly. Through this process, three types of solutions are derived: a complex solution, intermediate solution, and parsimonious solution. When both the parsimonious and intermediate solutions include the current causal condition, it becomes a core condition; if it only exists in intermediate solutions, then it becomes a marginal condition. Finally, by combining simplified solutions together, an overview of the intermediate solutions is presented in Table 7 to showcase the configuration results.

Table 7. Configuration analysis results.

Antecedent Condition	High ODT				Non-High ODT				
	S1a	**S1b**	**S2**	**S3**	**NS1a**	**NS1b**	**NS2**	**NS3**	**NS4**
MF	●	●	●		⊗	⊗	⊗	⊗	⊗
CQ	●	●	●	●			⊗	●	⊗
RQ	●	●		●	⊗	⊗		⊗	●
ID	•		•	•	⊗	⊗			●
FS	●	●	●	•		⊗	●	⊗	
TL		•	•	•	⊗		⊗	⊗	⊗
Consistency	0.868	0.886	0.875	0.882	0.817	0.839	0.791	0.875	0.834
Raw coverage	0.340	0.339	0.342	0.350	0.246	0.282	0.186	0.148	0.122
Unique coverage	0.030	0.029	0.031	0.039	0.011	0.077	0.041	0.022	0.020
Overall consistency			0.847				0.784		
Overall coverage			0.440				0.451		

Notes: ● indicates the presence of a core condition; ⊗ indicates the absence of a core condition; • indicates the presence of a peripheral condition; ⊗ indicates the absence of a peripheral condition; the blank area indicates "dispensable". Same as below.

4.3.1. Configuration Results of High Openness to Digital Transformation

The findings in Table 7 demonstrate the effective identification of three types of high openness to digital transformation configuration paths by fsQCA, which includes a set of second-order equivalent configurations (S1a and S1b). Among these three configurations resulting in "high openness to digital transformation," the consistency values are 0.868, 0.886, 0.875, and 0.882, respectively. This indicates that the combination of path factors can be considered as a sufficient condition for activating employees' openness towards digital transformation. The overall consistency value is calculated to be 0.847, surpassing the critical threshold of 0.75. Additionally, the overall coverage stands at 0.440, suggesting that this combination of conditions explains approximately 44% of the cases.

(1) Configuration S1a + S1b: comprehensive collaboration type under internal environment dominance.

The core conditions of configurations S1a and S1b remain unchanged, forming the second-order equivalent configuration, which is referred to as the "comprehensive cooperative type dominated by internal environment". It indicates that with high mindfulness, high communication quality, high relationship quality, and high family support as the

core conditions, and high industry dynamics or high transformational leadership as the peripheral condition, it can effectively activate the openness to digital transformation. It is evident that enhanced communication quality ensures the effective transmission of change plans, improved relationship quality fosters team cohesion in dealing with new situations, increased family support reduces individuals' resistance towards change, heightened mindfulness helps employees concentrate on the present moment, and personal characteristics along with coordination between internal and external environments activate employees' openness towards digital transformation. Moreover, in different configurations, high levels of both industry dynamics and transformational leadership play auxiliary roles in facilitating the exploitative activation of digital transformation. In path S1a specifically, high industry dynamics unconsciously shape employees' adaptability to change, while in path S1b, high transformational leadership assumes a leading and normative role in shaping employees' attitudes towards transformation.

(2) Configuration S2: the consideration of both the internal and external environment type under mindfulness characteristics' dominance.

This path shows that with high mindfulness, high communication quality, and high family support as the core conditions, and high industry dynamism and high transformational leadership as the peripheral conditions, it can effectively activate the openness to digital transformation. This implies that even if the four internal and external environmental conditions of an organization cannot simultaneously play a core role, considering all aspects of the internal and external environment while under the influence of employees' heightened mindfulness can lead to individuals being influenced by self-reinforcing environmental factors. On one hand, through subtle influences from charismatic and transformative leadership qualities, employees with a high level of mindfulness deepen their emotional investment in themselves. Consequently, they are more likely to generate a higher level of commitment towards change within an environment characterized by good communication quality, which supports organizational digital transformation. On the other hand, catalyzed by the dynamic nature inherent in their industry context and leveraging the positive impact exerted by familial factors on work performance, employees with elevated levels of mindfulness also enhance their psychological capital and self-efficacy. These improvements lay a solid psychological foundation for successful digital transformation.

(3) Configuration S3: the mindful substitution type under the internal environment's dominance.

This path shows that with high communication and relationship quality as the core conditions, and high industry dynamism, high family support, and high transformational leadership as the peripheral conditions, it can effectively activate the openness to digital transformation. This combination of antecedent conditions does not negate the role of individual factors. The original coverage within this pathway is 0.350, which surpasses that of S1a, S1b, and S2, indicating that the amalgamation of antecedent conditions in this pathway is more likely to activate the openness of digital transformation.

In addition, among the three configurations of high openness to digital transformation, both high communication quality and high family support are present, indicating that the dual role of the internal environment (high communication quality) and external environment (high family support) effectively activates the crucial collaborative mechanism for fostering employees' receptiveness towards digital transformation. Organizational communication serves as a vital information decoding mechanism for employees during times of digital transformation. Simultaneously, familial concern and support alleviate employees' apprehension towards workplace changes, reducing self-doubt in their adaptability and potential unemployment crisis while instilling confidence in achieving a work-life balance. High communication quality and strong family support synergistically bridge internal–external connections.

4.3.2. Configuration Results of Non-High Openness to Digital Transformation

Considering the causal asymmetry of the QCA method, that is, if the existence of certain antecedence conditions leads to high openness to digital transformation, the interpretation of symmetry is that if the same antecedence conditions do not exist, it will lead to non-high openness to digital transformation. However, the asymmetric feature of the QCA method means that there are other possibilities for the antecedent configuration of non-high openness to digital transformation. Therefore, this paper aims to provide a comprehensive understanding of the explanatory mechanism that influences employees' openness activation in digital transformation. Additionally, this study presents an analysis of configurations leading to non-high openness in digital transformation (refer to Table 7), effectively identifying four configurations. Firstly, configuration NS1a reveals that insufficient levels of mindfulness, relationship quality, industry dynamics, and transformational leadership hinder the attainment of high digital transformation openness among employees. Secondly, configuration NS1b demonstrates that when there is a lack of high mindfulness, relationship quality, industry dynamics, and family support simultaneously, it also inhibits the achievement of high digital transformation openness among employees. As both configurations NS1a and NS1b share core conditions alike, they collectively form a second-order equivalent configuration, indicating that achieving high digital transformation openness among employees is unattainable when both environmental factors and personal factors perform poorly. Secondly, the configuration NS2 demonstrates that achieving high digital transformation openness solely through high family support is challenging in the absence of high mindfulness, high communication quality, and high transformational leadership. Thirdly, configuration NS3 reveals that even with high communication quality, attaining high digital transformation openness remains difficult when there is a lack of high mindfulness, relationship quality, family support, and transformational leadership. Finally, configuration NS4 illustrates that despite employees' adaptability to industry transformation pace and the presence of high relationship quality within the organization, the effective activation of high digital transformation openness cannot be achieved without adequate levels of mindfulness, communication quality, and transformational leadership.

In addition, Table 7 reveals that the configurations of high openness to digital transformation exhibit significantly higher consistency and coverage compared to those with non-high openness. Conversely, within the four configurations generating non-high openness, it is evident that non-high mindfulness serves as the core condition, indicating a crucial inhibitory effect of employees' low level of mindfulness on activating digital transformation openness. Among the three configurations of high openness, high communication quality emerges as the core condition for effectively stimulating employees' digital transformation openness. This finding confirms that activating employees' openness towards digital transformation is not merely a matter of "causal symmetry".

4.4. Robustness Tests

The results of the robustness test are shown in Table 8. In order to validate the credibility of the research findings, this paper enhances the original consistency threshold from 0.8 to 0.85 and the PRI consistency threshold from 0.7 to 0.8. Additionally, it examines the robustness of the configuration by analyzing both the aggregation relationship between configurations before and after adjustment and variations in fitting parameters. Following the adjustment of thresholds, there is an improvement in the overall consistency for high digital transformation openness; however, no significant changes are observed. The resulting configuration outcomes demonstrate correspondence: M1 corresponds to S1b, M2 corresponds to S2, and M3 corresponds to S3; Q1 corresponds to S1a, Q2 corresponds to S1b, and Q3 corresponds to S3. These results indicate that Table 7's configuration analysis findings are robust.

Table 8. Robustness tests.

Antecedent Condition	High ODT					
	Raw Consistency Improved to 0.85			PRI Consistency Improved to 0.8		
	M1	M2	M3	Q1	Q2	Q3
MF	●	●		•	•	
CQ	●	●	●	●	●	●
RQ	•		●	●	●	●
ID		•	•	•		•
FS	•	•	•	•	•	•
TL	●	●	●		•	•
Consistency	0.886	0.875	0.882	0.868	0.886	0.882
Raw coverage	0.339	0.342	0.350	0.340	0.339	0.350
Unique coverage	0.029	0.031	0.039	0.030	0.029	0.039
Overall consistency		0.863			0.858	
Overall coverage		0.410			0.409	

5. Discussion and Conclusions

5.1. General Discussion

As digital transformation involves all levels of the organization, it not only requires the participation of all employees, but also requires organizational members to reach a "consensus on transformation". Therefore, in addition to configuring the hard conditions necessary for digital transformation, it is also important to pay attention to the soft conditions of the employees' openness to digital transformation; otherwise, when the employees realize that digital transformation may threaten their previous working conditions, it will hinder the digital transformation process and prevent enterprises from gaining a sustainable competitive advantage.

This paper is a relatively full discussion on the openness to digital transformation at the micro level, which distinguishes it from previous research that primarily focuses on macro and meso levels. Moreover, drawing upon the individual–environment interaction theory, we develop a research model encompassing personal factors, internal organizational environmental factors, external organizational environmental factors, and leader factors to reveal an in-depth antecedence configuration influencing the openness to digital transformation. This approach differs from previous studies that solely concentrate on specific level conditions. Additionally, by employing fsQCA and NCA as the research methods, we investigate the impact of antecedence-conditional coupling on the openness to digital transformation, thereby addressing the limitation of previous linear studies unable to explain asymmetric effects. Consequently, our study not only holds theoretical significance, but also offers practical insights for enterprise managers based on our research findings. Managers can manage their employees' openness to digital transformation to gain their buy-in and support for the digital transformation of their organizations, thus facilitating the digital transformation of their organizations and contributing to the sustainable development of their organizations.

5.2. Research Conclusions

Firstly, it is important to note that mindfulness, communication quality, relationship quality, industry dynamics, family support, and transformational leadership are not necessary conditions for explaining high openness to digital transformation or non-high openness to digital transformation. This suggests that none of these antecedental factors alone can fully account for the reasons behind such levels of openness in digital transformation. It indicates that effectively fostering employees' openness to digital transformation within the context of organizational change requires a coordinated and aligned approach involving multiple factors—a characteristic consistent with set theory. However, high communication quality and high family support persist as influential factors in the configuration path leading to high digital transformation openness. This implies that these two elements play a more universal role in activating an open mindset towards digital transformation.

Additionally, non-high mindfulness continues to hinder non-high open configurations in the realm of digital transformation. This finding highlights how employees' lack of mindfulness traits significantly contributes to resistance against embracing digital transformations. Furthermore, it is worth noting that there is no direct correspondence between the core conditions and either high or non-high levels of digital transformation.

Secondly, the configuration paths of high/non-high digital transformation openness are interrelated yet distinct, reflecting the concurrent causality inherent in the QCA method. There exist three pathways that induce high openness to digital transformation: a comprehensive collaboration type dominated by the internal environment (MF*CQ*RQ*FS*(ID + TL)), an internal and external environment consideration type dominated by the mindfulness trait (MF*CQ*ID*FS*TL), and a mindful substitution type dominated by the internal environment (CQ*RQ*ID*FS*TL). Upon comparing these three pathways, it is evident that configuration S3 has the widest coverage and serves as the primary inducer for activating digital transformation openness. On the other hand, there are four pathways leading to non-high openness to digital transformation: NS1a (~MF*~RQ*~ID*~TL), Ns1b (~MF*~RQ*~ID*~FS), NS2 (~MF*~CQ*FS*~TL), NS3 (~MF*CQ*~RQ*~FS*~TL), and NS4 (~MF*~CQ*RQ*ID*Tl). By comparing these four pathways, it becomes apparent that configuration NS1b possesses the broadest coverage and exerts a stronger inhibitory effect on digital transformation openness.

5.3. Research Contribution

The first contribution of this study is to broaden the research perspective on the driving forces behind digital transformation. Previous studies have predominantly focused on macro-level factors or single-dimensional perspectives when examining the digital transformation of enterprises, neglecting discussions on micro-level factors (such as individual attitudes) and their impact. Building upon the existing literature, this paper constructs a three-dimensional integrated research framework encompassing personal–context–leadership factors to investigate the activation mechanism of employees' openness in digital transformation, which enriches Klein et al.'s study on the micro-level impact of employees' cognitions, emotions, and attitudes on digital transformation, and responses to the concern of Polakova-Kersten et al. that, in the research on digital transformation, employees are rarely studied [52,53]. Secondly, it broadens the scope of application for person–environment interaction theory. Previous research has predominantly focused on applying this theory to consumer behavior, learning behavior, and other domains. In contrast, this study applies the explanatory mechanism of person–environment interaction theory to examine the digital transformation of enterprises. It explores how employees' cognitive attitudes react during this process and extends the potential applications of person–environment interaction theory. Thirdly, it enhances the testing methods for researching employees' cognitive behavior. Unlike the limited existing literature on attitudes towards digital transformation that primarily focuses on quantitative research using traditional regression methods without delving into the necessary conditions with a "sound" role, this paper employs NCA and fsQCA to identify the essential prerequisites for activating openness in digital transformation. This approach allows for a more detailed understanding of the intricate driving mechanism behind employees' activation of openness in digital transformation, thereby addressing scholars' call for method integration [54].

5.4. Recommendations

More emphasis should be placed on human resource management strategies during the process of digital transformation. Digital technologies, such as big data, cloud computing, blockchain, and artificial intelligence, play a crucial role in facilitating the digital transformation of enterprises. However, for employees, the adoption of digital technology entails increased learning costs and work pressure, and even the potential risk of job displacement. Therefore, organizations need to acknowledge that employees may resist digital transformation and effectively address this reality. This requires organizations to

incorporate employees' understanding of digital transformation while actively promoting the development of digital workplaces in order to replace their traditional mindset with a digital one [55]. On one hand, managers themselves should recognize the need for cognitive model transformation and updates; they should also formulate clear plans regarding the scope and specific paths for digital transformation based on their organization's existing expertise and capabilities. On the other hand, it is essential to leverage certain characteristics of transformative leadership—such as fostering team cohesion through shared vision-building and providing personalized support to subordinates—to train and cultivate employees' ability to think digitally by emphasizing both its necessity and importance. Only by taking employees as an important driving force of enterprise digital transformation and fully obtaining the support of employees can enterprises better achieve sustainable development with the help of digital transformation.

Second, organizational management should pay attention to the application of collaborative thinking in configuration. The synergistic effect of multiple types of conditional factors is often superior to that of a single factor. If an organization wants to gain support from employees during the start-up stage and throughout the entire digital transformation cycle, it must simultaneously consider the combined impact of employees' mindfulness characteristics, organizational environmental factors, and leadership factors. Over-reliance on a specific means or ability to activate and sustain employees' positive intention for transformation should be avoided. This implies that organizational managers should not only leverage the advantages of transformational leadership in terms of vision orientation and personnel motivation while accurately assessing their own leadership style, but they should also focus on stimulating employees' intrinsic initiative through mindfulness training. Additionally, they should dynamically align environmental factors with shaping employees' openness towards transformation and allocate organizational attention to both internal and external environments based on local conditions and timing. For instance, strengthening emotional bonds between employees and their families can be achieved by organizing regular family day activities and expressing care for employee's families during holidays. Regularly updating employees about industry trends as well as advancements in production/service technology enhances their adaptability mindset. However, continuous attention should be given to communication mechanisms related to digital transformation information.

5.5. Research Limitations and Prospects

Firstly, due to spatial limitations, we have endeavored to comprehensively summarize the antecedent conditions that impact employees' digital transformation openness, rendering the research model reasonably robust. However, it is important to acknowledge that certain variables were not considered, which may introduce some limitations in our findings. Secondly, this paper adopts a cross-sectional research design based on available data; future studies can enhance the accuracy of conclusions by employing multiple time points and longitudinal tracking methodologies. Thirdly, owing to data availability constraints, this study solely examines the static relationship between each antecedent and digital transformation openness. Future investigations could employ time series data and utilize TQCA and TSQCA methods to explore configuration change trajectories. Lastly, it is worth noting that due to the inherent characteristics of the QCA methodology employed in this research, our findings tend towards qualitative research bias.

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References

1. Rocha, C.; Quandt, C.; Deschamps, F.; Philbin, S.; Cruzara, G. Collaborations for digital transformation: Case studies of industry 4.0 in Brazil. *IEEE Trans. Eng. Manag.* **2021**, *70*, 2404–2418. [CrossRef]
2. Verhoef, P.C.; Broekhuizen, T.; Bart, Y.; Bhattacharya, A.; Dong, J.Q.; Fabian, N.; Haenlein, M. Digital transformation: A multidisciplinary reflection and research agenda. *J. Bus. Res.* **2021**, *122*, 889–901. [CrossRef]
3. Ghosh, K.; Khuntia, J.; Chawla, S.; Deng, X. Media reinforcement for psychological empowerment in chronic disease management. *Commun. Assoc. Inf. Syst.* **2014**, *34*, 22. [CrossRef]
4. Helton, E.; Liljegren, H. Att leda och kommunicera under en digital transformation: En studie om förändringsledning och förändringskommunikation inom en M&A—Organisation som genomgår digital transformation i ett tidigt skede. *Master Programm. Manag. Commun. IT* **2023**, 52. Available online: https://uu.diva-portal.org/smash/record.jsf?pid=diva2:1767124&dswid=8912 (accessed on 1 April 2024).
5. Meske, C.; Junglas, I. Investigating the elicitation of employees' support towards digital workplace transformation. *Behav. Inf. Technol.* **2021**, *40*, 1120–1136. [CrossRef]
6. Kaschig, A.; Maier, R.; Sandow, A. The effects of collecting and connecting activities on knowledge creation in organizations. *J. Strateg. Inf. Syst.* **2016**, *25*, 243–258. [CrossRef]
7. Zhu, Z.; Song, T.; Huang, J.; Zhong, X. Executive cognitive structure, digital policy, and firms' digital transformation. *IEEE Trans. Eng. Manag.* **2022**, *71*, 2579–2592. [CrossRef]
8. Song, Q.; Chen, X.; Gu, H. How Technological, Organizational, and Environmental Factors Drive Enterprise Digital Innovation: Analysis Based on the Dynamic FsQCA Approach. *Sustainability* **2023**, *15*, 12248. [CrossRef]
9. Fitzgerald, M.; Kruschwitz, N.; Bonnet, D.; Welch, M. Embracing digital technology: A new strategic imperative. *MIT Sloan Manag. Rev.* **2014**, *55*, 1–12.
10. Correani, A.; De Massis, A.; Frattini, F.; Petruzzelli, A.M.; Natalicchio, A. Implementing a digital strategy: Learning from the experience of three digital transformation projects. *Calif. Manag. Rev.* **2020**, *62*, 37–56. [CrossRef]
11. Reis, J.; Melão, N. Digital transformation: A meta-review and guidelines for future research. *Heliyon* **2023**, *9*, e12834. [CrossRef] [PubMed]
12. Li, B.; Zhang, M. The action mechanism of digital transformation on high-quality development of regional economy-The adjustment role of regional innovation Ability. *Syst. Eng.* **2022**, *40*, 57–68.
13. Narbariya, S.; Nayeem, M.A.; Gupta, R. Does HPWS amplify employees' change readiness for digital transformation? A study through the "work-from-anywhere" prism. *Pers. Rev.* **2022**, *51*, 1948–1966. [CrossRef]
14. Cetindamar, D.; Abedin, B.; Shirahada, K. The role of employees in digital transformation: A preliminary study on how employees' digital literacy impacts use of digital technologies. *IEEE Trans. Eng. Manag.* **2021**, *71*, 7837–7848. [CrossRef]
15. Horvath, D.; Szabo, R.Z. Driving forces and barriers of Industry 4.0: Do multinational and small and medium-sized companies have equal opportunities. *Technol. Forecast. Soc. Change* **2019**, *146*, 119–132. [CrossRef]
16. Ye, D.; Xie, W.; Zheng, L. Unleashing Intrapreneurial Behavior: Exploring Configurations of Influencing Factors among Grassroots Employees. *Behav. Sci.* **2023**, *13*, 724. [CrossRef] [PubMed]
17. Miller, V.D.; Johnson, J.R.; Grau, J. Antecedents to willingness to participate in a planned organizational change. *J. Appl. Commun. Res.* **1994**, *22*, 59–80. [CrossRef]
18. Wang, Y.; Gong, L.; Guo, Z.; Zhu, Y.; Liu, X. The effect of inclusive leadership on employees' change-supportive behavior: A study from the perspective of attachment theory. *Chin. J. Manag.* **2021**, *18*, 992–1000.
19. Zhao, W.; Li, P.; Fan, X. How does organizational politics affect openness to change? Job insecurity and organizational affective commitment as dual mediators. *Hum. Resour. Dev. China* **2016**, *19*, 38–45.
20. Wanberg, C.R.; Banas, J.T. Predictors and outcomes of openness to changes in a reorganizing workplace. *J. Appl. Psychol.* **2000**, *85*, 132–142. [CrossRef]
21. Koch, H.; Yan, J.; Curry, P. Consumerization-conflict resolution and changing IT-user relationships. *Inf. Technol. People* **2020**, *33*, 251–271. [CrossRef]
22. Jacobson, R.P.; Marchiondo, L.A.; Jacobson, K.J.; Hood, J.N. The synergistic effect of descriptive and injunctive norm perceptions on counterproductive work behaviors. *J. Bus. Ethics* **2020**, *162*, 191–209. [CrossRef]
23. Norton, T.A.; Parker, S.L.; Zacher, H.; Ashkanasy, N.M. Employee green behavior: A theoretical framework, multilevel review, and future research agenda. *Organ. Environ.* **2015**, *28*, 103–125. [CrossRef]

24. Liu, L.; Mei, Q.; Wu, J. The configurational effect of individual and situational antecedents on employee low-frequency safety violation: A perspective of individual-situation interaction theory. *J. Syst. Manag.* **2024**, *33*, 368–380.
25. Wang, H.; Wang, L.; Liu, C. Employee competitive attitude and competitive behavior promote job-crafting and performance: A two-component dynamic model. *Front. Psychol.* **2018**, *9*, 2223. [CrossRef] [PubMed]
26. Xu, X.; Payne, S.C.; Horner, M.T.; Alexander, A.L. Individual difference predictors of perceived organizational change fairness. *J. Manag. Psychol.* **2016**, *31*, 420–433. [CrossRef]
27. Sverdlik, N.; Oreg, S. Beyond the individual-level conceptualization of dispositional resistance to change: Multilevel effects on the response to organizational change. *J. Organ. Behav.* **2023**, *44*, 1066–1077. [CrossRef]
28. Alnuaimi, B.K.; Singh, S.K.; Ren, S.; Budhwar, P.; Vorobyev, D. Mastering digital transformation: The nexus between leadership, agility, and digital strategy. *J. Bus. Res.* **2022**, *145*, 636–648. [CrossRef]
29. Potipiroon, W.; Thawornprasert, W. The trickle-down effect of mayors' and administrators' change leadership on employees' change-supportive behaviour during COVID-19: The importance of local root similarity. *Public Manag. Rev.* **2023**, 1–20. [CrossRef]
30. Zhang, M.; Du, Y. Qualitative comparative analysis (QCA) in management and organization research: Position, tactics, and directions. *Chin. J. Manag.* **2019**, *16*, 1312–1323.
31. Hanelt, A.E.; Bohnsack, R.E.; Marz, D.; Antunes Marante, C. A systematic review of the literature on digital transformation: Insights and implications for strategy and organizational change. *J. Manag. Stud.* **2021**, *58*, 1159–1197. [CrossRef]
32. Lau, M.A.; Bishop, S.R.; Segal, Z.V.; Buis, T.; Anderson, N.D.; Carlson, L.; Shapiro, S.; Carmody, J.; Abbey, S.; Devins, G. The Toronto mindfulness scale: Development and validation. *J. Clin. Psychol.* **2006**, *62*, 1445–1467. [CrossRef] [PubMed]
33. Roemer, A.; Sutton, A.; Medvedev, O.N. The role of dispositional mindfulness in employee readiness for change during the COVID-19 pandemic. *J. Organ. Chang. Manag.* **2021**, *34*, 917–928. [CrossRef]
34. Huang, C.C.; Tu, B.; Zhang, H.; Huang, J. Mindfulness practice and job performance in social workers: Mediation effect of work engagement. *Int. J. Environ. Res. Public Health* **2022**, *19*, 10739. [CrossRef]
35. Gurbaxani, V.; Dunkle, D. Gearing up for successful digital transformation. *MIS Q. Exec.* **2019**, *18*, 6. [CrossRef]
36. Koschmann, M.A. A communication perspective on organisational stakeholder relationships: Discursivity, relationality, and materiality. *Commun. Res. Pract.* **2016**, *2*, 407–431. [CrossRef]
37. Pillemer, J.; Rothbard, N.P. Friends without benefits: Understanding the dark sides of workplace friendship. *Acad. Manag. Rev.* **2018**, *43*, 635–660. [CrossRef]
38. Deng, X.; Guo, X.; Wu, Y.J.; Chen, M. Perceived environmental dynamism promotes entrepreneurial team member's innovation: Explanations based on the uncertainty reduction theory. *Int. J. Environ. Res. Public Health* **2021**, *18*, 2033. [CrossRef] [PubMed]
39. Chummar, S.; Singh, P.; Ezzedeen, S.R. Exploring the differential impact of work passion on life satisfaction and job performance via the work–family interface. *Pers. Rev.* **2019**, *48*, 1100–1119. [CrossRef]
40. Kavikondala, S.; Stewart, S.M.; Ni, M.Y.; Chan, B.H.; Lee, P.H.; Li, K.K.; McDowell, I.; Johnston, J.M.; Chan, S.S.; Lam, T.H.; et al. Structure and validity of Family Harmony Scale: An instrument for measuring harmony. *Psychol. Assess.* **2016**, *28*, 307–318. [CrossRef]
41. Stone, D.L.; Deadrick, D.L.; Lukaszewski, K.M.; Johnson, R. The influence of technology on the future of human resource management. *Hum. Resour. Manag. Rev.* **2015**, *25*, 216–231. [CrossRef]
42. Tepper, B.J.; Dimotakis, N.; Lambert, L.S.; Koopman, J.; Matta, F.K.; Man Park, H.; Goo, W. Examining follower responses to transformational leadership from a dynamic, person-environment fit perspective. *Acad. Manag. J.* **2018**, *61*, 1343–1368. [CrossRef]
43. Chen, Y.; Jia, L.; Li, C.; Song, J.; Zhang, J. Transformational leadership, psychological empowerment and employees' organizational commitment: An empirical study in a Chinese context. *J. Manag. World* **2006**, *1*, 96–105+144.
44. Dul, J. Identifying single necessary conditions with NCA and fsQCA. *J. Bus. Res.* **2016**, *69*, 1516–1523. [CrossRef]
45. Brown, K.W.; Ryan, R.M. The benefits of being present: Mindfulness and its role in psychological well-being. *J. Personal. Soc. Psychol.* **2003**, *84*, 822–848. [CrossRef]
46. Tjosvold, D.; Law, K.S.; Sun, H. Effectiveness of Chinese teams: The role of conflict types and conflict management approaches. *Manag. Organ. Rev.* **2006**, *2*, 231–252. [CrossRef]
47. Yao, M.; Yu, Y.; Wu, J.; Ge, B. Network orientation and new venture performance: A moderated mediation model of ambidextrous learning and environmental dynamism. *J. Technol. Econ.* **2022**, *41*, 63–72.
48. Baruch-Feldman, C.; Brondolo, E.; Ben-Dayan, D.; Schwartz, J. Sources of social support and burnout, job satisfaction, and productivity. *J. Occup. Health Psychol.* **2002**, *7*, 84–93. [CrossRef]
49. Axtell, C.; Wall, T.; Stride, C.; Pepper, K.; Clegg, C.; Gardner, P.; Bolden, R. Familiarity breeds content: The impact of exposure to change on employee openness and well-being. *J. Occup. Organ. Psychol.* **2002**, *75*, 217–231. [CrossRef]
50. Fiss, P.C. Building better causal theories: A fuzzy set approach to typologies in organization research. *Acad. Manag. J.* **2011**, *54*, 393–420. [CrossRef]
51. Ragin, C.C. *Redesigning Social Inquiry: Set Relations in Social Research*; University of Chicago Press: Chicago, IL, USA, 2008.
52. Klein, S.P.; Spieth, P.; Söllner, M. Employee acceptance of digital transformation strategies: A paradox perspective. *J. Prod. Innov. Manag.* 2024; *early view*. [CrossRef]
53. Poláková-Kersten, M.; Khanagha, S.; van den Hooff, B.; Khapova, S.N. Digital transformation in high-reliability organizations: A longitudinal study of the micro-foundations of failure. *J. Strateg. Inf. Syst.* **2023**, *32*, 101756. [CrossRef]

54. Fainshmidt, S.; Witt, M.A.; Aguilera, R.V.; Verbeke, A. The contributions of qualitative comparative analysis (QCA) to international business research. *J. Int. Bus. Stud.* **2020**, *51*, 455–466. [CrossRef]
55. Raffaelli, R.; Glynn, M.A.; Tushman, M. Frame flexibility: The role of cognitive and emotional framing in innovation adoption by incumbent firms. *Strateg. Manag. J.* **2019**, *40*, 1013–1039. [CrossRef]