Research article

Unlocking digital potential: Exploring the drivers of employee dynamic capability on employee digital performance in Chinese SMEs-moderation effect of competitive climate

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ABSTRACT

While dynamic capabilities have been described as crucial for achieving organizational performance in dynamic environments, there has been limited scholarly distinction between dynamic capabilities and employee dynamic capabilities (EDC), especially in the digital era. Consequently, a knowledge gap has emerged. To address this void, this paper aims to investigate the driving factors of EDC and their impact on employee digital performance (EDP). Simultaneously, incorporating the competitive climate (CC) as a moderating variable between employee dynamic capabilities and employee digital performance addresses theoretical gaps in specific regions in China, particularly in small and medium-sized enterprises (SMEs). This study utilizes survey data from SMEs in four Chinese provinces: Shanghai, Guizhou, Guangdong, and Anhui. It employs CB-SEM (AMOS) to analyze the new conceptual framework. Firstly, the research uncovers that the positive relationship between digital capabilities and employee digital performance necessitates employee dynamic capabilities as a mediator. Secondly, there exists a direct and indirect relationship between organizational learning and employee digital performance. Finally, this study discerns that the competitive climate moderates the relationship between employee dynamic capabilities and employee digital performance. This finding demonstrates remarkable alignment with the competitive culture in specific regions of China. The research results encourage SMEs to seize the opportunities presented by emerging digital technologies and industry digitization trends. They should commit to embracing new digital technologies, enhancing digital capability, strengthening organizational learning, fostering a positive competitive climate, and focusing on the development of employee dynamic capability to enhance their competitive edge. The findings of this research contribute not only to academic inquiry but also furnish pertinent decision-making references for relevant departments.

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1. Introduction

In the wake of the dissemination of 21st-century internet and digital technologies, there has been a transformation like global business focal points [1]. Presently, In the highly competitive and ever-changing context of the market, digital transformation has become a cutting-edge means for enterprises to gain a competitive advantage [2]. Priyono et al. [3] posit that the adoption of digital technology in organizations necessitates employees to possess the capability to navigate the increasingly intricate organizational environment [3]. It is widely acknowledged that SMEs can be deemed as an effective driver for poverty alleviation in particular regions. Examining the worldwide landscape of SME development, SMEs constitute 90% of all businesses and contribute to 50% of global employment [4]. Data indicates that the digital transformation of SMEs has enhanced business outcomes, concurrently elevating employee productivity and output [5]. Consequently, whether it be SMEs or other organizations, there is a concerted effort to seek employees with skills and talents, aiming to excel in the process of digital transformation. Research indicates that both digital technology and human capital exert profoundly significant influences on any organization and society at large [6]. The essence of humanity lies in change, and digital transformation should be human-centric [6]. Especially, the proficient utilization of digital technologies by employees to achieve job performance, referred to as digital performance, has been acknowledged as a pivotal factor in the success of digital transformation [7]. Consequently, in the digital era, employee performance has gradually evolved into digital performance [8,9]. In 2022, Shao et al. [8] introduced, for the first time, a definition of employee digital performance. They delineated employee digital performance into two components: Digital-Driven Task Performance, wherein employees utilize next-generation digital technologies to achieve standard task performance, and Digital-Enabled Innovative Performance, whereby employees employ cutting-edge digital technologies to innovate task performance [8]. Furthermore, research evidence shows that top management support and transformational supervisory leadership improve employee digital performance. Their research consolidates and extends the existing literature on managerial support for technological utilization, propelling information systems leadership theory into the digital milieu [8]. In the same year, Zhang and colleagues also empirically demonstrated that the internal use of digital technology within organizations similarly exerts a significant impact on task performance and innovative performance (employee digital performance) [9].

Beyond examining the impact of human resource management on employee digital performance, scholars posit that sustained organizational competitive advantage should also consider three core elements. Firstly, the significant role of digital capabilities in influencing employee performance [10]. Secondly, the influence of organizational learning on employee performance. Thirdly, the effect of employee dynamic capabilities on employee performance [11,12]. Primarily, digital capabilities and organizational learning are compelling SMEs to adopt a more innovative mindset [13]. Moreover, the survival of SMEs may necessitate digital capabilities [13]. In addition, organizations oriented toward learning can adapt more effectively to the constantly changing environment than their competitors [14]. In this regard, global competition and emerging forms of innovation suggest that relying solely on the current management and organizational reserves is insufficient to ensure the competitiveness of businesses; continuous organizational learning is the fount of sustainable competitive advantage [15]. Secondly, in the digital age of rapid technological advancement, beyond organizational learning and digital capabilities, SMEs need to cultivate robust dynamic capabilities. This is crucial for swiftly conceiving, implementing, and adapting business models, thereby maintaining a competitive edge in the burgeoning digital economy [13].

Since 2020, some scholars have turned their attention to the pivotal role of employee dynamic capabilities in achieving job performance in rapidly changing markets. Moreover, it has been frequently emphasized in research that organizational capabilities and organizational learning can fuel employee dynamic capabilities, thereby enhancing employee performance [11,12]. However, there is a gap in the literature explicitly demonstrating the positive impact of organizational learning and digital capability on employees' digital performance, especially in the background of SMEs undergoing digital transformation. This paper aims to bridge this theoretical gap. Research also indicates that the most crucial element in driving digital transformation is the workforce, and organizations need employees with dynamic capabilities to fully harness digital technologies. Employees with digital capabilities play a pivotal role in boosting organizational productivity by integrating and mobilizing human and technological advantages and resources [16,17]. Moreover, empirical evidence has demonstrated that the impact of employee dynamic capabilities on performance surpasses the influence of employees' attitudes (such as job satisfaction) and behavioral variables (such as work motivation) in dynamic and evolving markets [11,12]. Furthermore, Numerous studies have shown that the significant role of variables such as job satisfaction and work motivation as intermediaries in influencing employee performance [18,19]. Nonetheless, there is a notable paucity among current scholars in applying employee dynamic capabilities to investigate their impact on employee digital performance in the dynamically evolving digital market.

This study follows the resource-competitive advantage paradigm, known as the "resource-capability-performance" analytical framework [20]. Dynamic capabilities constitute an appropriate theoretical framework to comprehend the interplay of resources, capabilities, and performance [21,22]. While the framework of dynamic capabilities stands as one of the paramount subjects in the realm of strategic management, its constructive application in the digital environment for value creation has received limited scholarly attention [23,24]. In 2020, employee dynamic capabilities were defined as the ability of employees to adapt and address current challenges in a dynamically changing market. It encompasses four distinctive features: the capacity to sense environmental changes, adaptability to environmental changes, proactive resolution of workplace challenges, and innovation within the workplace, coupled with a continual commitment to personal development and learning [12]. To address these gaps, it is crucial to underscore that this study leverages the Resource-Based View and its extension – Dynamic Capability Theory. The aim is to tackle the research question by constructing and evaluating a conceptual framework [21]. Indeed, the evidentiary support underscores that digital capabilities and organizational learning serve as valuable resources, endowing SMEs with a sustainable competitive advantage and fostering the

cultivation of dynamic capabilities [13,25]. Furthermore, in the rapidly evolving market landscape, besides emphasizing strategy, resources, and dynamic capabilities, organizations also need to form an interdependent system with the internal and external environment, collectively determining the sustainable competitive advantage of enterprises [22]. Moreover, the alignment of enterprise-level elements with the environment enhances competitive advantage [22]. Firstly, Building upon the established evidence in human resource management (top-level management support and transformational supervisory leadership) [8] and technology adoption [9] on employee digital performance, This paper addresses the impact of resources (digital capability and organizational learning) on employee digital performance, thus filling a theoretical gap in understanding how resources influence performance. Secondly, by distinguishing employee dynamic capabilities, derived from dynamic capabilities theory, from organizational dynamic capabilities, this paper highlights the pivotal role of employees in the digital era. Lastly, examining the competitive climate as an environmental variable to moderate the relationship between employee dynamic capabilities and digital performance holds significant practical relevance, especially within specific cultural contexts.

RQ1. Do organizational learning and digital capability can drive employee dynamic capability?

In 2019, digital capabilities were defined as the digital dynamic capabilities of new enterprises, utilizing digital-related infrastructure, resources, and platforms to achieve entrepreneurial objectives. Research indicates that digital capability is the paramount resource for SMEs to enact digitalization [26]. Additionally, it serves as a pivotal variable in achieving sustainable competitive advantage for SMEs [26]. Beyond underscoring the significance of digital capability, organizational learning stands as another crucial factor propelling the development of employee dynamic capabilities [11]. Organizational learning uses the four stages of obtaining, sharing, applying, and remembering information to maintain a competitive advantage by maximizing resource use [27]. Moreover, digital capability and organizational learning are two interrelated research domains, as digital capability necessitates learning capacity, Namely, harnessing learning to explore new capabilities [28]. In this sense, digital capabilities and organizational learning mean that the aim of building dynamic capabilities has now become critical [27]. Moreover, based on the RBV-DCT framework, the organization possessing resources for sustainable competitive advantage (such as digital capabilities and organizational learning) contributes to the development of dynamic capabilities [21]. Furthermore, in the absence of capability and resource readiness, organizations will encounter significant challenges in managing digital transformation [29]. Particularly in SMEs, the organization's digital capabilities facilitate the incorporation and utilization of digital technologies necessary for the process of preparedness and innovation [13,30].

The literature gap is especially prevalent in SMEs, SMEs struggle to implement new technologies due to a lack of resources, skills, and digital awareness [31]. Therefore, overcoming these challenges requires SMEs to enhance various capabilities and emphasize continuous learning, which will contribute to strengthening employee dynamic capabilities, such as perceiving, searching, and selecting the right sources of digital knowledge, recognizing new digital opportunities, altering customer interactions, and changing existing conventions or resource allocations which are the fundamental characteristics of dynamic capability [32]. While the important significance of employee dynamic capability in organizational development is gaining attention in dynamic markets, the factors driving employee dynamic capabilities in the digital era remain largely unexplored [11,33]. Therefore, this study posits that digital capabilities and organizational learning are key factors driving employee dynamic capabilities.

RQ2. Does employee dynamic capability translate digital capability and organizational learning into better employee digital performance?

Benitez et al. [34] conceptualized the notion of digital capabilities as a dynamic capability, enabling businesses to perceptively seize and capitalize on opportunities, thereby providing organizations with ample responsiveness [34]. In terms of dynamic capabilities, digital dynamic capability refers to how individuals effectively leverage digital skills and transform them into drivers of digital performance [35]. Therefore, digital capabilities provide organizations with sufficient responsiveness and necessary technological infrastructure. Employees with strong dynamic abilities are more likely to embrace and successfully leverage digital skills, thereby enhancing their digital performance [36]. Current research indicates that organizational involvement in information technology exploration and development can enhance employees' qualities and capabilities in innovative digital technologies. Simultaneously, they have a positive impact on employees' dynamic capabilities. An essential result of digital capabilities is the sustained influence on dynamic digital capabilities, driving organizational performance [17].

In addition, organizational learning is seen as the most fundamental value of an organization. It can also communicate a vision of future development with members of the organization, inspire members to think creatively outside the rules and promote mutual understanding and the attainment of common goals through learning and knowledge-sharing across all parts of the business [37]. In this process, Employees are the main forces behind change rather than being passive recipients. Their mindset, values, and attitudes towards digital transformation are crucial for the organization to gain a competitive edge in the future. Therefore, in this inevitable, dynamic, and complex process, employees must engage in continuous learning, enhancing their dynamic capabilities and elevating their performance levels [38]. Organizational learning refers to the systematic process through which individuals within an organization generate, retain, and share knowledge. This process relies heavily on the ability of individuals to create new knowledge and effectively apply it to enhance organizational practices, leading to long-term improvements in performance [39].

Moreover, Organizational learning refers to the systematic process of "increasing learning, knowledge, enhancing each member's capabilities through mutual learning, developing skills, and collectively envisioning the whole," positively influencing employee performance [40]. In addition, organizational learning enables firms to continuously adapt to market demands and is therefore also considered a dynamic capability [41]. In the field of knowledge-based dynamic capabilities, organizational learning involves knowledge creation and the transfer of explicit information into organizational memory. As learning organizations foster activities in

knowledge creation and application, they consequently influence employee dynamic capabilities, leading to outstanding performance [25]. Research indicates that organizational learning fosters employees' digital skills, digital literacy, and work motivation [42], job satisfaction, and employee engagement [12]. Therefore, organizational learning contributes to the development of employee dynamic capabilities. Furthermore, scholars have repeatedly mentioned that organizational capabilities and continuous learning can drive employee dynamic capabilities, thereby enhancing job performance [11,12,43], However, lacking theoretical validation, this study aims to fill this research gap.

RQ3. Does the Competitive Climate Moderate the Relationship Between Employee Dynamic Competence and Employee Digital Performance?

Confucian cultural values exert a discernible influence on competitiveness and elevated performance levels in East Asian societies, including China, Japan, and Korea [44]. Chinese cultural tenets, such as the Confucian work ethic and a diligent work ethos, assume pivotal roles in sculpting employee attitudes and behaviors, subsequently influencing overall performance [45]. Yang conducted a study encompassing individuals aged between 18 and 64 years in China, Korea, and the Caucasus. The research adhered to ethical guidelines approved by the Human Research Ethics Committee of Macquarie University. The empirical findings unveiled a proclivity for intra-organizational competition among individuals from East Asian countries, namely China and Korea [46]. Furthermore, external environmental pressures can instigate varied competitive behaviors among employees [47]. Organizations can amplify their competitive climate to function as a potent environmental force that catalyzes employee performance [48].

Based on the DCT, in a dynamic market, dynamic capabilities can indeed provide a competitive advantage to businesses. However, the extent of this effect depends on the vitality levels of both internal and external business environments [22]. Although the perspective on dynamic capabilities enjoys considerable popularity in the literature, it has faced criticism due to its ambiguous boundary conditions and the bewildering discourse surrounding the impact of dynamic capabilities [22]. An essential reason for concern is that the existence of dynamic capabilities is frequently associated with environmental conditions marked by high dynamics [22]. Dynamic capabilities' benefits depend on organizational routines and their deployment context. Additionally, environmental forces influence organizational adaption patterns [49]. Moreover, the theory of dynamic capabilities particularly emphasizes the role of environmental dynamism as a potentially crucial background variable [22]. Moreover, the dynamism of the business environment may enhance the effectiveness of dynamic capabilities and their potential for competitive advantage [50]. Therefore, incorporating the competitive climate as an environmental variable into the study fills a gap in the dynamic capabilities framework, enhancing organizational competitiveness by aligning resources, dynamic capabilities, strategy, and external environment [22].In conclusion, the use of competitive climate as an environmental variable to moderate the relationship between employee dynamic capabilities and employee digital performance is a very important and relevant study based on a specific cultural region in the Middle East.

2. Theoretical background and hypotheses development

2.1. Theoretical foundation

The Resource-Based View (RBV) highlights the significance of resources as the primary driver of an enterprise's competitive advantage and guarantees its enduring and sustainable growth. According to the theory, an enterprise is a collective of different resources, and the competitive advantage of the enterprise is determined by the accumulation of these resources [20]. The essential resource types comply with Barney's criteria: valuable, rare, inimitable, and non-substitutable (VRIN).VRIN resources can maintain long-lasting competitive advantages [20]. They are typically intangible, such as digital capabilities and organizational learning. This is partly due to the unclear definition of property rights for most intangible assets, making them almost non-negotiable and challenging to acquire [20]. Moreover, capabilities are a form of intellectual capital that is challenging for other enterprises to imitate or replicate. Companies must concentrate their resources, build a unique core competency system, and enhance their core capabilities. This involves relying on internal organizational resources, such as digital capabilities, and accumulating capital through continuous learning to ultimately achieve sustainable competitive advantages [51].

Dynamic capabilities prioritize the combining of resources and the capacity to adapt in a dynamic setting to overcome the inflexibility of core capabilities. Moreover, the effective utilization of technological resources, coupled with dynamic capabilities and the organizational environment, can assist companies in enhancing creativity and maintaining sustainable competitive advantages [22]. More specifically, dynamic capabilities comprise both "capability" and "dynamic." "Capability" underscores the integration, adaptation, and reconfiguration of external and internal organizational resources, skills, and functional capabilities to meet the ever-changing environmental demands [21].On the one hand, dynamic capabilities emphasize a company's internal processes aimed at developing and renewing the company's capabilities and resources. On the other hand, the aim is to adapt or adjust to changes in environmental conditions. While the first approach to the concept seems to link "dynamic" to changing environmental conditions, the latter contribution suggests that it emphasizes the ongoing changes in the firm's capabilities and resources [21]. It is noteworthy that the concept of dynamic capabilities as meta-capability continues to receive significant attention in both management theory and practice, showcasing its enduring vitality [51]. In particular, over the past two years, Employee Dynamic Capabilities as part of Dynamic Capabilities Theory [12] have garnered attention from scholars [11,12,52,53]. Moreover, in addition to emphasizing strategy, resources, and dynamic capabilities, the sustainability of an organization requires interdependence with the internal and external environment, collectively determining the sustainable competitive advantage of the enterprise. Furthermore, when elements at the organizational level harmonize with the environment, competitive advantage is enhanced [22]. This study formulates the subsequent hypothetical model by utilizing research and analysis (Fig. 1).

2.2. Digital capability and employee digital performance

The digitization is continually reshaping the market, presenting new opportunities for businesses. RBV and DCT are particularly apt for comprehending how a company's digital capabilities contribute to outstanding performance and lay the groundwork for business development [20,22]. Digital capabilities, in themselves, can be considered a manifestation of dynamic capability. They encompass various dynamic actions, including perception, seizing, and transformation, such as identifying new digital opportunities, responding to digital transformation, and leveraging digital technologies to develop innovative products/services/processes [35]. The rapid expansion of digital technologies has hastened workplace transformation, requiring individuals to have stronger digital skills. While organizational strategies for enhancing sustainable employee performance are uncertain, the relationship between digital capability and employee performance has been thoroughly studied, yet the results are equivocal [35]. Past research indicates that digital innovation serves as a mediator in the relationship between digital capabilities (DC) and both financial and non-financial performance [54]. Nasiri et al. [52] believe that employees with strong digital capabilities tend to be more productive. They can efficiently navigate digital tools, reducing the time required to complete tasks and enhancing overall output. Research suggests that digital capabilities indirectly influence employee performance [52]. Moreover, employees who possess digital capabilities are often more creative in problem-solving and can contribute to innovative solutions, thereby exerting a positive impact on digital performance [35]. Employees with robust digital capabilities can make more data-driven decisions. They can analyze and interpret data, leading to more informed strategic decisions that impact their digital performance [36]. Herwina conducted a study indicating that digital capabilities have a direct influence on employee performance in the Indonesian technology industry [53]. It is noteworthy that the preceding analysis highlights the industry-specific variability in the influence of DC on employee performance. Given the current emphasis on Chinese SMEs, additional analysis is warranted to substantiate this observation. Based on this, we propose the following hypothesis.

H1a. Digital capabilities have a positive and significant association with Employee Digital Performance in Chinese SMEs.

2.3. Organizational learning and employee digital performance

Within the context of corporate digital transformation, employee learning capabilities and enthusiasm have become pivotal factors for enhancing employee performance and long-term sustainable development [55]. Empirical research indicates that exploratory learning is a key driving factor of employee performance [56]. However, Robbins et al. [57] reveal that the association between organizational learning and job performance is not necessarily close. Other variables are required to strengthen this relationship and determine the extent of organizational learning's contribution to performance improvement [57]. Hendri claims that work happiness and organizational commitment mitigate the effect of organizational learning on employee performance [58]. Nevertheless, empirical research conducted by India's leading Information Technology (IT) companies has discovered that organizational learning directly influences employee performance [59], and organizational learning significantly influences sustainable performance in SMEs in Pakistan [41]. Furthermore, Imani et al. [60] have confirmed that organizational learning drives innovation and improves employee performance. It is possible to elevate employee performance levels even further through additional mediation by organizational innovation [60]. As a result of the variations in conclusions across different industries, scholars have observed significant disparities in the relationship between organizational learning and employee performance. Therefore, this study is essential for further verification in the context of SMEs undergoing digital transformation. Based on this, the following hypothesis is established.

H1b. Organizational learning has a positive and significant association with Employee Digital Performance in Chinese SMEs.

2.4. Digital capability and employee dynamic capability

The Resource-Based View is a mature framework in innovation literature, widely employed to elucidate how enterprises attain competitive advantages and achieve outstanding performance. This theory posits that exceptional corporate performance is attributed to the unique, rare, and inimitable resources and skills possessed by the enterprise [20]. The conceptualization of digital capability is essential as a crucial asset for companies undergoing digital transformation. Failure to adopt new digital technologies may result in
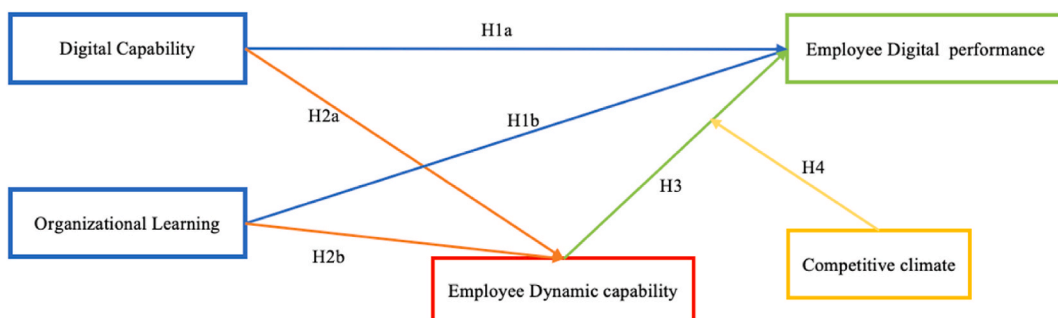

Fig. 1. Hypothesis model.

losses for these companies [13]. Khin and Ho [35] posit that organizations with robust digital capabilities provide employees with advanced tools and resources. This enables them to stay ahead of technological trends, incorporate new solutions into workflows, and foster continuous learning and adaptation. Furthermore, digital capabilities cultivate employees' agile thinking, making them adept at problem-solving, seeking innovative solutions, and embracing change. Moreover, employees with digital capabilities contribute to integrating market data and insights, mastering real-time information to effectively respond to market changes, and aligning their actions with organizational goals [61]. Fundamentally, organizational investments in digital capabilities create an environment that nurtures and enhances dynamic capabilities. As employees become more adept at leveraging digital tools and staying abreast of technological advancements, they can contribute more effectively to the organization's agility, innovativeness, and overall adaptability in the face of dynamic market environments [62]. To this end, we posit the following hypothesis.

H2a. Digital capabilities have a positive and significant association with employee dynamic capabilities (EDC) in Chinese SMEs.

2.5. Organizational learning and employee dynamic capability

From an employee's perspective, digital transformation imposes new demands on their knowledge and skills. The transition to digital technologies, the utilization of new devices, digital tools, novel collaborative workflows, and collaborative models have created a significant disparity between the job requirements and the employees' actual capabilities [63]. These disparities not only present new learning requirements for employees but also provide learning opportunities. In other words, to bridge these gaps and meet job demands, employees need to engage in proactive learning [64]. Learning refers to the proactive acquisition of new knowledge, skills, and competencies by individuals in their work [65]. Through learning, employees can amass knowledge, enhance their skills, facilitate personal growth, and fulfill their individual needs. Moreover, employees who engage in learning are more inclined to explore actively, adopt a creative and open-minded approach, and participate enthusiastically [55]. Furthermore, organizational learning is crucial for individual growth. Learning is a dynamic concept that gradually shifts from individual learning to organizational learning [42]. Consequently, the impact of learning enhances employees' awareness, knowledge, and skills, ultimately leading to an elevation at the organizational level [60]. As early as 2010, scholars argued that organizational learning does not have a direct influence on performance. Instead, it exerts its influence by enhancing dynamic capabilities through the accumulation of knowledge and innovation [66]. Through learning, organizations can cultivate organizational knowledge and capabilities to sense, acquire, and reconfigure data and knowledge for capturing digital opportunities, thereby maintaining their competitive edge [67]. Pollok et al. [68] also highlighted that organizational learning aids in developing organizational wisdom and generating new knowledge, thus fostering member engagement in conveying novel ideas and assisting organizations in adapting to an ever-changing environment [68]. Investigating 170 Iranian pharmaceutical companies out of a total of 200, Farzaneh et al. [62] found a significant positive correlation between organizational learning and dynamic capabilities, as well as their dimensions of learning, integration, and reconfiguration [62]. Within human resources service companies, research indicates that organizational learning also has a significantly positive impact on dynamic capabilities (resource integration and resource reconfiguration) [25]. However, in 2023, Bornay-Barrachina et al. [69] conducted a survey involving 106 companies and quantitatively demonstrated that organizational learning directly or indirectly influences dynamic capabilities, depending on the type of department [69]. Hence, organizational learning shapes its digital skills and enhances the proactivity of employees. It augments their problem-solving and analytical abilities while strengthening their capacity to address issues. Similarly, this study postulates that in SMEs undergoing digital transformation, organizational learning can significantly impact employee dynamic capability.

H2b. Organizational learning has a positive and significant relationship with employee dynamic capabilities (EDC) in Chinese SMEs.

2.6. Employee dynamic capability and employee digital performance

In 2020, Bienkowska and Tworek [12] elucidated the crucial role of employee dynamic capabilities in the modern, dynamically changing work environment. In such a context, sustainability is deemed unattainable without dynamic capabilities. Empirical analysis indicates that, with employee attitudes and behavioral variables as mediating variables, employee dynamic capabilities indirectly impact job performance. In 2021, Bienkowska et al. [11] revisited the impact of employee dynamic capabilities on job performance in dynamically changing markets. The results indicated that employee dynamic capabilities have a more significant influence on job performance compared to employee attitudes and behavioral variables. In 2022. Phan et al. [70] introduced the important variable of employee dynamic capability into the digital technology industry for research. Phan et al. [70] assessed the impact of employee dynamic capabilities on fintech adoption and innovative employee work behaviors, The results of empirical analyses showed that employee dynamic capabilities have a significant impact on fintech adoption, innovative employee work behaviors, and employee performance [70]. In 2023, Al Wali et al. [71] elucidated that employee dynamic capabilities play a crucial role in determining innovative work behavior. Innovative work behavior, in turn, acts as a mediator between employee dynamic capabilities and job performance. This study demonstrates the impact of employee dynamic capabilities on employee digital performance, encompassing both digitally-driven task performance and task-driven innovation performance [8]. Therefore, this study posits that employee dynamic capabilities foster employee digital performance (digital innovation performance and digital task performance). To this end, the study formulates the following hypotheses.

H3. Employee dynamic capability (EDC) has a positive and significant relationship with employee digital performance (EDP) in Chinese SMEs.

2.7. Mediating role of employee dynamic capability

The utilization and dissemination of digital technology inherently enhance organizational digital capabilities and self-efficacy. Research indicates that digital-driven capabilities improve employees' task performance, while digital-driven self-efficacy significantly influences innovation performance [8]. Digital capability embodies an organization's proficiency in leveraging digital technologies, tools, and processes to attain strategic objectives. However, employee dynamic capability serves as the impetus for determining how individuals adeptly harness digital capability and transform it into digital performance [38]. Employee dynamic capability, characterized by adaptability, empowers individuals to adeptly respond to and navigate digital changes, challenges, and opportunities. Digital capability, serving as the foundational technological infrastructure, finds optimal utilization in the hands of adaptable employees, thereby amplifying employee digital performance [36]. Digital capability lays the foundation for innovation by providing access to digital tools, platforms, and data. However, digital capability drives the actual generation and implementation of innovative digital solutions [24]. Dynamic capability enables individuals to effectively analyze and resolve complex digital challenges, while digital capability provides the necessary resources to identify and address digital problems [34]. Therefore, dynamic capability enhances the relationship between digital capability and employee digital performance. Moreover, organizations must not only consider the existing capabilities of employees but, more importantly, their ability to integrate, build, and reconfigure capabilities. Organizations can further enhance employee dynamic capability and improve work performance through continuous learning [33]. To deliver outstanding innovation performance, organizational learning should primarily transform into dynamic capability. This involves the ability to generate, integrate, share, and leverage knowledge, enabling enterprises to reconfigure resources and modify their knowledge base—a key driver of innovation. This implies that the extent to which organizations prioritize organizational learning will vary in its impact on enhancing innovation performance [72]. Moreover, dynamic capability is the outcome of learning through repetition, experimentation, and recognizing new opportunities. Organizational learning encompasses the company's ability to identify new ideas, acquire knowledge, commercialize this knowledge, and update processes, gradually streamlining the company's task flows to achieve task performance [73]. Utilizing survey data from Taiwan's high-tech industry to validate the comprehensive model of dynamic capabilities, this study's findings indicate that organizational learning significantly influences employee performance, with dynamic capability acting as a mediating variable [66]. Farzaneh et al. [62] conducted a survey involving 170 out of a total of 200 pharmaceutical companies in Iran. The research suggests that dynamic capability mediates the relationship between organizational learning and innovation performance [62]. Furthermore, Chen and Zheng [25] empirically demonstrated that dynamic capabilities (resource integration capability and resource reconfiguration capability) mediate the relationship between organizational learning and performance.

From the above analysis, it is evident that, firstly, dynamic capabilities can mediate the relationship between digital capabilities and organizational learning and performance. However, it fails to distinguish between employee dynamic capabilities and dynamic capabilities. Secondly, empirical studies show variations in the impact on performance across different industries. Therefore, based on SMEs, this study aims to explore their relationships, necessitating further analysis and verification. Hence, the following hypothetical relationships are proposed.

H5a. Employee dynamic capabilities mediate the relationship between digital capabilities and employee digital performance in Chinese SMEs.

H5b. Employee dynamic capabilities mediate the relationship between organizational learning and employee digital performance in Chinese SMEs.

2.8. Moderating role of competitive climate

The study examined the moderating effects of Eastern and Western cultural backgrounds, economic development levels, power distance, and individualism on the relationship between DC and firm performance [74]. The analysis revealed the moderating effects of cultural background. In this context, some surprising results were found. It was observed that compared to the Western orientation, the Eastern orientation characterized by high power distance and low levels of individualism had a stronger influence on the relationship between DC and firm performance [75]. The term "competitive climate" refers to an organizational environment where employees are compelled to assess their performance in comparison to others, leading to a sense of competition and pressure [76]. Such an environment encourages employees to be competitive, and in this competitive work environment, employees spare no effort in striving to outperform others. In other words, a competitive work climate promotes employee initiative and enhances their performance levels [25]. Furthermore, dynamic capabilities have a positive impact on organizational performance in various ways, such as aligning resource capabilities with the ever-changing environment [22]. The empirical analysis indicates that perceived environmental dynamics merely moderate the association between dynamic capabilities (DCs) and business model innovation, sustainable competitive advantage, and firm performance. The presence of a cutting-edge cultural environment has a substantial impact on the connection between dynamic capacities and the level of creativity achieved [62]. Moreover, the technological and market environments positively moderate the effects of dynamic capabilities (resource integration capabilities and voluntary restructuring capabilities) on performance [25]. Despite extensive research on the role of dynamic capabilities in influencing performance, scant attention has been given to other contextual factors impacting this relationship [62]. Considering the focus on SMEs in the context of DT, it is imperative to conduct further investigation. Based on this, the following hypothesis is established.

H4. Competitive climate moderates the relationship between Employee Dynamic Capabilities (EDC) and Employee Digital

Performance (EDP) in SMEs.

3. Research methodology

To achieve the research objectives and address the research questions, this study employs a quantitative methodology. Data is collected through surveys and subsequently analyzed to examine the relationships between variables and test the proposed hypotheses. The study focuses on SMEs engaged in digital operations as the unit of analysis.

3.1. Sample and data collection

The survey questionnaire comprises two sections: The first segment captures the demographic and social characteristics of the respondents, encompassing factors such as gender, age, work region, and educational background. Additionally, the primary focus of this study is on SMEs engaged in digital operations. Consequently, the survey encompasses two specific criteria: first, meeting the definition requirements for SMEs, particularly in terms of employee count [77]. The second part involves the core questionnaire, encompassing five latent variables and their 26 measurement indicators (Appendix A). The measurement questions for digital capability, competitive climate, and employee dynamic capability utilize a Likert 7-point scale, ranging from "strongly disagree" to "strongly agree," with scores assigned from 1 to 7 in ascending order. For organizational learning and employee digital performance, a Likert 5-point scale is employed. The translation of these scales adheres to standard direct and back translation procedures. This study gathered data from SMEs in four provinces: Shanghai, Guangzhou, Anhui, and Guizhou. The survey commenced on June 10, 2023, and employed two methods to acquire the SME list: the SME Information Network (www.sme.com.cn) and the China Administration for Industry and Commerce. The purpose of the survey was communicated to the identified companies. Using a purposeful sampling approach, 320 potential companies were proportionally selected from the four provinces. Subsequently, the survey was distributed to potential respondents through the Questionnaire Star platform, emphasizing the anonymity of the survey. By October 16, 2023, a total of 108 companies responded, resulting in a response rate of 33.75%, out of the 800 survey questionnaires distributed. After careful verification and the removal of 160 invalid responses, 300 valid questionnaires were obtained (a 65% response rate). Considering the characteristics of this study, Daniel Hooper's statistical analysis was employed to determine an appropriate sample size. The calculation indicated that a sample size of 223 or more would be sufficient. Therefore, we believe that the sample size used for analysis is adequate [78]. The selection of these four provinces as the survey targets is justified by several considerations. Firstly, Shanghai is renowned as a financial and economic hub. Guangzhou serves as a manufacturing and trade center; Hefei has a mix of traditional and emerging industries, and Guizhou is currently undergoing digital transformation. Secondly, the inclusion of SMEs across diverse industries in these provinces ensures the representativeness of the sample and aligns with their significant contribution to the overall economic output.

3.2. Measures

Examining the demographic characteristics, a notable majority of respondents (52.3%) identified as male. In terms of age distribution, 22.3% fell within the bracket of 18–25 years, while 30.0% were aged between 26 and 30 years. A significant portion of respondents (48.0%) fell within the 31–50 age range, with a smaller fraction (4.3%) aged between 51 and 60 years. Regarding educational backgrounds, less than 2.0% of respondents had completed secondary education, 56.7% had attained a bachelor's degree,

Table 1
Basic parameter analysis.

		Frequency	Percent
Gender	Male	157	52.3
	Female	143	47.7
Age	18~25	67	22.3
	26~30	75	25.0
	31~40	121	40.3
	41~50	23	7.7
	51~60	13	4.3
	60 above	1	0.3
Education background	Middle School below	6	2.0
	Middle School	7	2.3
	High school	42	14.0
	Bachelor	170	56.7
	Postgraduate students	75	25.0
No of employee	< 10 employees	49	16.3
	10employees < 49employees	75	25.0
	50 employees < 249 employees	61	20.3
	250 employees < 400employees	110	26.7
	400employees < 1000 employees	35	11.7
	More than1000 employees	0	0.0
	Total	300	100.0

and 25% held a master's degree. Concerning the size of employees in the surveyed SMEs, all participating enterprises met the defined criteria for Chinese SMEs, with the employee count in all surveyed SMEs being below 1000.The specific information is presented in Table 1.

3.3. Scale reliability and validity tests

In the realm of social science research, CB-SEM (Covariance-Based Structural Equation Modeling) is employed for confirmatory studies. It is characterized by validating mature theoretical models with strong latent variables, testing models with large samples, and assuming linear relationships among latent variables. Unlike PLS-SEM, which is used for exploratory research and developing new theoretical constructs, this study, grounded in a mature theory, falls into the category of confirmatory research. Consequently, CB-SEM was utilized to validate the hypothesized relationships. Initially, a single-factor confirmatory factor analysis was conducted using SEM. The fit indices were considerably lower than those of the original model, indicating no significant common method bias [79]. Subsequently, collinearity diagnostics were performed using SPSS 26.0. Collinearity, mainly examining the overlap between independent variables, suggests an issue in variable selection if there is a significant overlap. VIF (Variance Inflation Factor) below 10 indicates the absence of multicollinearity among the independent variables [80]. The analysis reveals that the range of VIF is between 2.584 and 3.107, indicating the absence of an issue with collinearity in this study. Finally, upon establishing the measurement model, an evaluation of the reliability and validity of the obtained factors was conducted (Table 2). The Cronbach's alpha for each scale exceeded 0.9, demonstrating strong internal consistency. The composite reliability (CR) also adhered to reliability standards, surpassing the threshold of 0.7, as recommended. Reliability assessment relies on the estimation of CR for each variable and the Average Variance Extracted (AVE). Suggested values for CR and AVE should be 0.70 or higher and 0.50 or higher, respectively. Thus, in the measurement model, if the loading of constructs is at least 0.50, it is considered reliable [81]. As depicted in Table 2, the composite reliability scores ranged from 0.904 to 0.972, while the AVE scores fell within the range of 0.702–0.874, both surpassing the recommended thresholds of 0.70 and 0.50, respectively. These results indicate that the measurement model exhibits mutual validity and reliability. Convergent validity assesses whether the items pertaining to a specific construct converge with the latent construct. Factor loadings, corresponding t-values, and the AVE are employed for measuring convergent validity [81]. The factor loadings for each construct all exceeded the critical threshold of 0.50 (ranging from 0.825 to 0.944) and were statistically significant ($p < 0.001$). Additionally, these factor loadings demonstrated statistical significance ($p < 0.001$), with z-values ranging from 17.521 to 28.469 (all exceeding the critical threshold of 1.96). this study also conducted normality tests, with skewness and kurtosis of all items falling within the range of skewness ±2 and kurtosis ±2, respectively. This indicates that all items were well modeled through a normal distribution (Appendix C)

Table 2
Reliability and validity test.

Dimensions		Unsta.	S.E.	Z	P	Stad.	Cronbach 's	CR	AVE
OL	OL5	1				0.836	0.928	0.929	0.724
	OL4	1.015	0.058	17.521	***	0.825			
	OL3	1.035	0.052	19.864	***	0.891			
	OL2	1.014	0.054	18.722	***	0.86			
	OL1	0.972	0.054	18.098	***	0.842			
DC	DC5	1				0.89	0.973	0.972	0.874
	DC4	1.074	0.029	36.525	***	0.915			
	DC3	1.065	0.037	28.664	***	0.962			
	DC2	1.034	0.037	27.667	***	0.944			
	DC1	1.042	0.037	28.469	***	0.96			
CC	CC4	1				0.847	0.901	0.904	0.702
	CC3	0.833	0.053	15.662	***	0.766			
	CC2	1.036	0.051	20.212	***	0.9			
	CC1	0.985	0.055	17.868	***	0.834			
EDC	EDC1	1				0.862	0.966	0.968	0.832
	EDC2	1.092	0.036	30.56	***	0.928			
	EDC3	1.085	0.042	25.548	***	0.922			
	EDC4	1.151	0.047	24.295	***	0.939			
	EDC5	1.149	0.05	23.199	***	0.92			
	EDC6	1.061	0.048	22.211	***	0.901			
EDP	EDP1	1				0.831	0.952	0.952	0.768
	EDP2	1.094	0.055	19.884	***	0.889			
	EDP3	1.02	0.052	19.673	***	0.884			
	EDP4	1.047	0.053	19.754	***	0.886			
	EDP5	1.082	0.054	19.929	***	0.89			
	EDP6	1.048	0.054	19.387	***	0.876			

Note. ***$p < 0.001$ level (one-tailed); CR ¼ composite reliability; AVE ¼ average variance extracted. in AMOS, one loading must be fixed to 1; hence, the t-value cannot be calculated for this item.

3.4. Discriminatory validity test

The concept of discriminant validity pertains to the presence of a low correlation or significant differentiation between latent traits represented by latent variables and those represented by other latent variables. If the square root of the AVE for each latent variable surpasses the inter-variable correlation for that latent variable with other latent variables, it signifies robust discriminant validity [81]. This suggests notable differences among the underlying characteristics represented by the variables used as indicators. The study shows that the square root of the AVE for each latent variable is consistently higher than the correlation between that latent variable and other latent variables, as seen in Table 3. As a result, the measurement model has excellent ability to distinguish between different constructs.

3.5. Model fit tests

Model fit pertains to the extent of congruence between the theoretical model and the observed model. In this study, various fit indices have been employed to assess the quality of the measurement model. The traditional $\chi 2$ is used to evaluate the overall fit of the model. The chi-square statistic is highly sensitive to sample size [82]. Thus, a range of other fit indices should be utilized to assess the overall goodness of fit of the Confirmatory Factor Analysis (CFA) solution, such as the TLI, CFI, RMSEA, and SRMR. High values of the first two indices (around 0.95) indicate a good model fit [83]. Conversely, RMSEA and SRMR values greater than 0.07 signify a good fit, approaching 0.10 indicating an acceptable fit. The selection of these fit indices in this study is based on their satisfactory performance in simulation studies [83]. Table 4 illustrates that the results indicate a strong alignment between the structural model and the data. By employing Maximum Likelihood estimation in the analysis of SEM, the fit indices for the data and the model are as follows: $\chi2(266) = 753.461$ (p < 0.001), CMIN/DF = 2.644, CFI = 0.952, AGFI = 0.890, IFI = 0.952, RMSEA = 0.074, CFI = 0.952, and TLI = 0.945. All major fit indices are either above or close to 0.9 [83]. These results indicate that the proposed attitude-behavior association model is robust both theoretically and empirically. Comparing the fit indices in Table 4 and Appendix E (Fig. 5) shows that this study does not have common method bias.

3.6. Path hypothesis and moderating effect test

The standardized path coefficients between variables (Table 5) reveal that there is a non-significant relationship between Digital Capability and EDP (β = −0.031, p = 0.495 > 0.05). This implies that Hypothesis H1a is not supported. OL exhibits a significant positive impact on EDP (β = 0.320, p < 0.001). DC exerts a significant direct influence on EDC (β = 0.334, p < 0.001), as does OL (β = 0.662, p < 0.001). EDC, in turn, demonstrates a significant direct impact on EDP (β = 0.329, p < 0.001). Therefore, Hypotheses H1b, H2a, H2b, and H3 receive empirical support.

For the Moderating effect Test, this study follows Ping's approach of computing interaction terms (EDC × CC) based on the effects of each observed variable in the linear model. These interaction terms are then included in the mediation model, establishing direct relationships between the interaction terms and EDC [82]. The analysis results confirm that this moderation model fits the data well. The inclusion of the interaction terms leads to improved data fit. Simultaneously, the interaction term between EDC and CC exhibits a significant positive association with EDP (γ = 0.088, p < 0.001). This implies that a positive competitive climate positively moderates the relationship between EDC and EDP, thereby providing support for Hypothesis H4. The analysis model of the moderating variable is presented in Appendix D (Fig. 4).

3.7. Mediation effect test

The Hayes mediation method is a widely accepted and recognized approach for assessing mediating effects. It provides valuable insights into the pathways through which variables interact, deepening the understanding of complex relationships [84]. The objective of this study is to investigate the possible connections in which independent variables have an impact on dependent variables, and the decision to utilize Hayes' mediation approach is suitable. It is applicable to SEM and is suitable for establishing relationships or associations between variables in cross-sectional data [84]. To examine the mediating effects, Hayes suggests that Bootstrap is the most robust method, and it has been fully integrated into AMOS for conducting random sampling any number of times, setting appropriate confidence intervals. The rationale behind this method is that if the confidence interval contains zero, there is no mediation effect,

Table 3
The discriminatory validity test of potential variables.

	EDP	EDC	CC	DC	OL
EDP	**0.876**				
EDC	0.798	**0.912**			
CC	0.765	0.786	**0.838**		
DC	0.636	0.742	0.701	**0.935**	
OL	0.780	0.813	0.771	0.757	**0.851**

Notation: The square root of the average variance retrieved for each construct is indicated in bold and italic, while the inter-correlations are displayed off-diagonally.

Table 4
Fit indices of measurement and structural mode.

Fit indices	X^2/N	SRMR	RMSEA	GFI	AGFI	IFI	CFI	TLI
Reference values	<3.000	<0.080	<0.080	>0.900	>0.900	>0.900	>0.900	>0.900
Test values	2.644	0.079	0.074	0.878	0.890	0.952	0.952	0.945

Note: TLI: Tucker-Lewis's index; CFI: Comparative fit index; RMSEA: Root means the square error of approximation; SRMR: standardized root means square residual.

Table 5
The test results of path relationship.

Path relationship		Path coefficient	S.E.	C.R.	P	Estimate
H2b	OL - > EDC	0.662	0.074	8.976	***	0.588
H2a	DC - > EDC	0.334	0.067	5.01	***	0.296
H1b	OL - > EDP	0.320	0.059	5.135	***	0.405
H1a	DC - > EDP	−0.031	0.045	−0.682	0.495	−0.041
H3	EDC - > EDP	0.329	0.05	6.618	***	0.5
Path relationship of moderating						
H4	EDCC-EDP	0.088	0.021	4.186	***	1.025

while if it does not, a mediation effect is present [84].In the context of Structural Equation Modeling, we conducted 1000 iterations of Bias-Corrected Percentile Bootstrap resampling to test the mediation effects for OL-EDC-EDP and DC-EDC-EDP [85]. The results are presented in Table 6. Direct effect testing reveals that the direct effect of OL-ED on EDP is supported, as the 95% confidence interval does not include zero. However, the path of DC-EDP includes zero in its 95% confidence interval, thus failing to receive support. Additionally, the indirect effects of both "OL-EDC-EDP" and "DC-EDC-EDP" are statistically significant, as indicated by the fact that neither of their 95% confidence intervals encompasses zero. This validates Hypotheses H5a and H5b. Additionally, it is evident that "EII1/EII2" explains 10.8%, while it explains 66.5% for "EII1/TIE," and 33.5% for "EII2/TIE." This indicates that the mediation effect path for OL is more prominent than that for Digital Capability (DC). Moreover, the combined mediation effects, represented by "(EII1 + EII2)/TE," account for 54.8% of the total effect. This suggests that the mediation effect is more substantial than the direct effect. Given that Digital Competence does not have a direct impact on EDP, this study underscores the particularly significant role of OL in enhancing EDP. The mediation analysis model is presented in Appendix E (Fig. 4).

Based on the analysis of the path relationships, mediation, and moderation tests conducted, the following relationships have been identified (Fig. 2).

4. Discussion

Given the pervasive uncertainty that characterizes today's rapidly changing world, Digital transformation is widely regarded as a valuable capacity-building endeavor, empowering businesses to compete in dynamic and competitive environments. Against this

Table 6
The mediating effect of Bootstrapping.

path relationship	Point estimate	Product of coefficient		Bootstrapping			
				Bias-corrected		Percentile 95% CI	
		SE	Z	Lower	Upper	Lower	Upper
Indirect Effects							
OL→EDC→EDP	0.218	0.050	4.360	0.136	0.352	0.122	0.323
DC→EDC→EDP	0.110	0.038	2.895	0.042	0.193	0.041	0.190
ITE	0.327	0.072	4.542	0.188	0.473	0.174	0.462
Direct Effects							
OL→EDP	0.300	0.078	3.846	0.162	0.469	0.157	0.465
DC→EDP	−0.031	0.067	−0.463	−0.154	0.104	−0.161	0.095
DTE	0.270	0.104	2.596	0.088	0.511	0.078	0.490
Comparison of Mediating Effects							
EII1/EII2	0.108	0.053	2.038	0.018	0.248	0.001	0.220
The ratio of Mediated to Total Effects							
EIIE1/TIE	0.665	0.078	8.526	0.502	0.816	0.504	0.816
EIIE2/TIE	0.335	0.078	4.295	0.184	0.498	0.184	0.496
TIE/TE	0.548	0.144	3.806	0.266	0.836	0.272	0.848

Note: ITE (Indirect Total Effects), DTE (Direct Total Effects), TDE (Total Direct Effects) pertain to OL→EDP and DC→EDP; TE (Total Effects) refers to TDE + IE; EII1 represents OL→EDC→EDP, and EII2 signifies DC→EDC→EDP; SE denotes Standard Error; Z represents the Z value; LLCI stands for the lower limit of the 95% confidence interval; ULCI represents the upper limit of the 95% confidence interval.
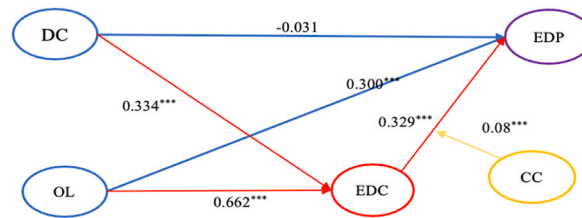
Fig. 2. Model estimation for the moderation-mediation model.

backdrop, this study seeks to investigate the contribution of organizational learning and digital Capability as sustainable factors driving employee dynamic capability and enhancing employee digital performance. To accomplish this, eight critical hypotheses were formulated and analyzed based on data collected from SMEs.

To address RQ1, an assessment of H2a and H2b was conducted. The results indicate that both Digital Capability and organizational learning have a positive impact on employee dynamic capability. Consequently, H2a and H2b find support, affirming that Digital Capability and organizational learning are pivotal drivers of employee dynamic capability. Firstly, the significant positive influence of digital Capability on employee dynamic capability aligns with findings in studies such as [35,62]. This discovery implies that digital capability often encompasses the acquisition and utilization of digital knowledge and skills. Such knowledge transfer equips employees with the ability to understand and effectively employ digital tools, data, and technology. In turn, this empowers them to adapt to evolving circumstances and learn how to innovatively apply digital resources to problem-solving [61]. When employees possess the tools and knowledge to leverage digital resources, they are more likely to explore creative solutions, adapt to new challenges, and optimize various resources, including time, data, and information. This efficient resource management is an indispensable component of dynamic capability.

Furthermore, SMEs equipped with robust digital capability can gain a competitive edge. Digital capability enables employees to work efficiently and effectively, consequently enhancing overall employee performance. This competitive advantage stands as the core outcome of dynamic capability and forms the bedrock of success for SMEs in the dynamic business environment [86]. Additionally, the significant positive impact of organizational learning on employee dynamic capability aligns with similar consistency found in studies [62,66–68]. Even though the research was primarily focused on the relationship between organizational learning and employee dynamic capability. The conclusions substantiated in this study concerning organizational learning and employee dynamic capability effectively bridge the critical role that different stakeholders play in the context of digital development within dynamic capabilities. This signifies that the process of organizational learning involves the acquisition, sharing, and dissemination of internal knowledge within an organization. When an organization actively promotes learning, it ensures that its employees have access to the latest industry insights, best practices, and emerging trends [67]. Moreover, internal learning within organizations typically encompasses training and skill development programs designed to enhance employees' capabilities, including digital skills. By investing in skill development, organizations can empower their employees to adapt to new technologies and digital tools, thereby enhancing their dynamic capabilities.

Finally, organizational learning often emphasizes knowledge sharing and collaboration among employees. When individuals share insights, collaborate on projects, and learn from one another, collective knowledge and competency awareness are fostered, ultimately strengthening the core capabilities of enterprise development. Furthermore, organizational learning can assist organizations in optimizing their resources, including data, information, and technology. The effective utilization of these resources is an indispensable component of dynamic capabilities, as it enables SMEs to effectively respond to change and seize opportunities [87,88]. Consequently, organizational learning has a positive impact on employee dynamic capability. This analysis underscores the importance of cultivating a culture of learning and continuous improvement within an organization to enhance employee dynamic capability and adapt to the rapidly changing digital landscape.

To address RQ2, hypotheses H1a, H1b, H3, H5a, and H5b were tested. The results indicate that employee dynamic capabilities mediate the influence of digital capability on employee digital performance, supporting H5a. Additionally, employee dynamic capabilities also mediate organizational learning and employee digital performance, supporting H5b. Therefore, hypotheses H1a, H1b, H3, H5a, and H5b are collectively supported in answering the second research question, confirming that employee dynamic capabilities transform digital capability and organizational learning into improved employee digital performance. In terms of the size of the mediating effect, EII1/EE2 accounts for 10.8%. This suggests that the role of organizational learning in employee dynamic capabilities and employee digital performance is greater than that of digital capabilities, further corroborating the research by Guo and Bui. While digital capabilities can simplify the learning process for businesses and facilitate efficient and innovative business models [89] organizations can acquire, share, and utilize information more accurately and rapidly through employee learning, enhancing learning and performance efficiency through digital capabilities [90]. The findings regarding the mediating effect of employee dynamic capabilities in this study suggest that organizations committed to adopting digital technologies and enhancing employee dynamic capabilities are more likely to develop innovative digital solutions, thereby improving employee digital performance. This is particularly crucial for SMEs in the ever-evolving landscape of digital transformation. In this context, where technology is rapidly advancing, SMEs must cultivate digital capabilities and reinforce organizational learning to stay competitive. Firstly, the hypothesis that employee dynamic capabilities act as a mediator between digital capabilities and employee digital performance is supported, and consistent with studies [24,36]. This finding implies that digital capabilities typically involve the acquisition and enhancement of digital skills and

knowledge. When employees master these skills, it directly enhances their employee dynamic capabilities and, in turn, elevates employee digital performance. Additionally, digital capabilities enable employees to effectively transmit digital knowledge. They share this knowledge within the organization, contributing to the formation of a culture of learning and the dissemination of digital expertise. The process of knowledge sharing is a fundamental element of the corporate data center, as it promotes adaptability and continuous learning. Therefore, this analysis underscores the importance of nurturing employees' digital capabilities, which not only directly impact employee digital performance but also strengthen their dynamic capabilities, enabling them to thrive in the ever-changing digital landscape. Secondly, the hypothesis that employee dynamic capabilities act as a mediator between organizational learning and employee digital performance is supported, and consistent with studies [25,62,66]. This finding implies that organizational learning enhances the acquisition and sharing of knowledge within the organization. When employees engage in learning activities, they are exposed to new information, allowing them not only to absorb this knowledge but also to effectively apply it in the digital environment, thereby improving employee digital performance.

Furthermore, organizational learning encourages employees to engage in critical thinking, problem-solving, and innovation. Employee dynamic capabilities mediate this relationship by applying the innovative thinking and problem-solving abilities cultivated through organizational learning to digital challenges. employee dynamic capabilities empower employees to creatively address digital issues, thereby enhancing employee digital performance.

To address RQ3, H4 was tested, and the results indicate that the competitive climate moderates the relationship between employee dynamic capabilities and employee digital performance. Thus, H4 is supported, highlighting the significant impact of a competitive cultural environment on the development and performance of organizations in specific regions of China. The significant moderating effect of the competitive climate on employee dynamic capabilities and employee digital performance aligns with the findings [25,62]. In summary, the competitive environment of Chinese SMEs plays a crucial role in moderating the relationship between employee dynamic capabilities and employee digital performance. It motivates employees to strive for excellence, encourages continuous learning, fosters innovation, and enhances adaptability. All these factors are vital components of employee dynamic capabilities, making them a key moderating factor in driving digital performance in a competitive climate. This discovery implies that, firstly, in highly competitive environments, employees are highly motivated to surpass their peers, driving them to excel in digital tasks. As they actively seek to enhance their skills and capabilities to gain a competitive edge, this motivation catalyzes improving the corporate data center. Competition sparks innovation and creativity. We encourage employees to propose innovative solutions to digital challenges, surpassing their peers. This innovative drive directly enhances employee dynamic capabilities because adaptability and creative problem-solving are integral components of dynamic capabilities [46].

In conclusion, the competitive climate of Chinese SMEs plays a paramount role in moderating the relationship between employee dynamic capabilities and employee digital performance. It motivates employees to strive for excellence, encourages continuous learning, fosters innovation, and enhances adaptability. All these factors are vital components of employee dynamic capabilities, making them a key moderating factor in driving employee digital performance in a competitive environment.

5. Research implications

5.1. Theoretical implications

First, this study makes a clear distinction between dynamic capability theory and employee dynamic capabilities, thereby emphasizing the pivotal role of employee dynamic capabilities for organizational development during the process of digital transformation [12,71].

Secondly, this study innovatively introduces the driving factors behind employee dynamic capabilities, addressing a previous research gap. Notably, this research holds epoch-making theoretical significance for both larger organizations and SMEs. It provides an optimal theoretical foundation for future studies on how organizational support factors can effectively propel employee dynamic capabilities to better achieve organizational objectives [11,12,43]. Designating employee dynamic capability as a mediating variable deepens the organization's understanding of the relationship between individual capabilities and employee digital performance. This theoretical insight necessitates organizations to more meticulously investigate the various components of employee dynamic capability (resource perception, seizing, and configuring abilities) [25]. They serve as a mediating in the impact of digital capability on employee outcomes, providing a foundation for targeted intervention measures.

Third, according to these results. digital capability does not directly affect employee digital performance in Chinese SMEs [54,52]. This suggests the necessity to reassess existing theoretical frameworks and consider other factors that may influence the impact of digital capability on employee digital performance, particularly within the context of Chinese SMEs. Furthermore, organizational learning, through the mediating role of employee dynamic capability, exerts direct and indirect influences on employee digital performance. This suggests dual characteristics of organizational learning, which enhances our understanding of employee digital performance in the special context of Chinese SMEs. It urges studies to understand how organizational learning affects employee digital performance through employee dynamic capability.

Finally, the moderating function of the competitive climate shows that employee dynamic capability's impact on digital performance in SMEs may vary depending on external competitive conditions [22,25,63]. This underscores the importance of considering external environmental factors when comprehending employee digital performance.

5.2. Practical implications

First, This study explores the influence of digital capability and organizational learning on employee digital performance, bridging the gap in previous research on digital employee performance (Top Leader and Supervisory Leaders) [8]. This study underscores the pivotal roles of digital capability and organizational learning in achieving employee digital performance in Chinses SMEs. Specifically, HRM, digital capability, and organizational learning emerge as central factors influencing employee digital performance in SMEs.

Second, the study emphasizes that organizations should acknowledge that fostering employee dynamic capabilities is a strategy to enhance digital performance. This involves emphasizing employees' perception, seizing, and transforming abilities concerning technology, Furthermore, it underscores the significance of imparting digital skills and maintaining continuous learning. By doing so, organizations can empower employees to adeptly navigate the constantly evolving digital environment [74].In addition, the practical impact suggests that organizations should employ a comprehensive approach to organizational learning. Instead of implementing isolated training measures, it is more effective to develop an integrated strategy aligning learning initiatives with specific digital capabilities and job roles. This may entail incorporating digital skill development into broader organizational learning programs and fostering a culture that values continuous improvement [67–69].

Finally, acknowledging the moderating role of the competitive environment, organizations should adjust their strategies accordingly. In a competitive landscape, emphasis may be placed on strategic agility. The flexibility of training programs and strategic planning is crucial for addressing specific challenges posed by the external competitive environment [72]. Additionally, given the dynamic nature of digital capabilities and the moderating effect of the competitive climate, SMEs should adopt a continuous monitoring and adaptation approach. Regular assessments of employee dynamic capability, the effectiveness of organizational learning, and adjustments to strategies based on the evolving competitive landscape are crucial for sustaining digital performance.

6. Limitations and future research directions

First, while this study has made significant contributions, it is not without limitations, indicating opportunities for future research. it's noteworthy to mention that this study categorizes employee digital performance into task-driven performance and innovation-driven performance. The conclusions drawn suggest that, although the impact of organizational learning and digital capabilities on employee digital performance is demonstrated, there is a lack of distinction between the differential effects of digital capabilities and organizational learning on task performance and innovative performance. Hence, future research should delve more profoundly into this aspect.

Second, treating employee dynamic capabilities as a mediating variable enhances our understanding of the relationships between digital capability, organizational learning, and employee digital performance. However, this study failed to differentiate the diverse impact of employee dynamic capabilities (perception, grasping, and transformation) on employee digital performance. Therefore, future research should more broadly investigate the influence of various facets of employee dynamic capabilities on employee digital performance. This meticulous exploration can offer more targeted insights.

Third, based on past research on the influence of top management support and transformational supervisory leadership on employees' digital performance, this paper explored digital capabilities and organizational learning, which suggests that for future research, we should explore the influence of more factors (from the organizational level) on employees' digital performance, such as organizational culture and other factors. In addition, this study is based on existing literature to determine that employee dynamic ability variables are superior to employee attitude and behavior variables [11,12]; however, these studies are based on other industries, and further comparative analyses are needed in future studies to analyze the differential effects of employee dynamic ability and employee attitude and behavior variables as mediator variables on employee digital performance. Furthermore, it's important to acknowledge that this study, while introducing the competitive climate as a moderating variable, is rooted in the theoretical framework based on the specific regional competitive cultural environment in China. Thus, it does have certain limitations. Future research endeavors could extend beyond different countries and regions to explore the influence of digital transformation and the competitive climate on employee dynamic capabilities and employee digital performance within diverse cultural and market contexts. Such investigations could consider factors like policies, economic environments, and technological advancements in their impact on employee digital performance.

Finally, it is essential to note that the sample in this research primarily focused on SMEs in China. Hence, the results may lack generalizability, posing difficulties in immediately applying them to different countries or firms of different sizes. data collecting was carried out using online surveys. Online surveys are a useful research tool, but they have limits, especially in terms of subjectivity, which can lead to study bias.

Data availability statement

https://drive.google.com/drive/my-drive (accessed on January 20, 2024).
The authors affirm that they have no known competing financial interests or personal relationships that might have influenced the work reported in this paper.

CRediT authorship contribution statement

Guifang Wang: Writing – original draft, Supervision, Software, Resources, Project administration, Methodology, Investigation,

Formal analysis, Data curation, Conceptualization. **Yue Niu:** Funding acquisition. **Zuraina Dato Mansor:** Supervision. **Yee Choy Leong:** Supervision. **Zhen Yan:** Resources.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Table A1. Scale items

Table 1
Variables Operationalization

No	Digital capability	Source
1	Acquiring important digital technologies	Bongiorno&Giorgio,2018
2	Identifying new digital opportunities	
3	Responding to digital transformation	
4	Mastering the state-of-the-art digital technologies	
5	Developing innovative products/services/processes using digital technology.	
	Organizational learning	
1	Our organization encourages employees to attend training sessions to acquire new knowledge	Kordab et al., 2020; Mollah et al.,
2	Our organization considers employees' learning as an investment in knowledge creation	2023
3	Our organization encourages employees to store the learning they earn	
4	Our organization has broad training processes where employees can share knowledge	
5	Our organization encourages employees to continue their education, which will be a benefit to the organization	
	Employee Dynamic Capability	
1	Change sensitivity: I quickly notice and successfully recognize in the environment (both inside and outside of the organization) opportunities and threats (including early warning signals) that can affect the work I do.	Bieńkowska&Agnieszka,2020
2	Change adaptation: I adapt effectively to the opportunities and threats appearing in the environment (both inside and outside the organization). I undertake preventive actions that will enable me to carry out the tasks entrusted to me despite changes in the environment.	
3	Change sensitivity: I quickly notice and successfully recognize problems appearing at the workplace	
4	Problem-solving and innovative approach: I quickly solve problems appearing, I do it on my own or seek support (within the scope of knowledge and information) that allows me to perform assigned tasks.	
5	Problem-solving and innovative approach: I generate innovative ideas and original solutions to problems.	
6	Personal development: I constantly develop my competencies and raise my qualifications. I develop myself through my work.	
	Competitive climate	
1	My manager frequently compares my results with those of other employees.	Wang et al., 2018
2	The amount of recognition you get in this company depends on how your performance ranks compared to other employees.	
3	Everybody is concerned with finishing at the top of the performance rankings.	
4	My coworkers frequently compare their results with mine.	
	Employee Digital performance	
1	I find solutions to work problems after performing analytics with the big data generated by smart/digital technologies.	Shao et al., 2022
2	I need less time to complete job tasks by analyzing big data.	
3	The quality of my work has been improved with analytics of big data.	
4	I try out innovative ways to improve business performance or product/service quality through performing analytics of the big data generated by smart/digital technologies.	
5	I come up with creative solutions to task problems through data analytics.	
6	I try new and innovative ideas at work when performing analytics with big data.	

Appendix B

Table 2
Basic parameter analysis

		Frequency	Percent
Gender	Male	157	52.3
	Female	143	47.7
Age	18~25	67	22.3
	26~30	75	25.0
	31~40	121	40.3

Table 2 (*continued*)

		Frequency	Percent
	41~50	23	7.7
	51~60	13	4.3
	60 above	1	0.3
Education background	Middle School below	6	2.0
	Middle School	7	2.3
	High school	42	14.0
	Bachelor	170	56.7
	Postgraduate students	75	25.0
No of employee	< 10 employees	49	16.3
	10employees < 49employees	75	25.0
	50 employees < 249 employees	61	20.3
	250 employees < 400employees	110	26.7
	400employees < 1000 employees	35	11.7
	More than1000 employees	0	0.0
	Total	300	100.0

Table 3
Definition of SME in China

Industry Type	SMEs	Medium	Small	Micro
Manufacturing	Employees<1000 OR Revenue<400 million RMB	Employees ≥ 300 AND Revenue ≥ 20million RMB	Employees ≥ 20 AND Revenue ≥ 3 million RMB	Employees<20 OR Revenue<3 million RMB
Wholesale	Employees<200 OR Revenue<400 million RMB	Employees ≥ 20 AND Revenue ≥ 50 million RMB	Employees ≥ 5 AND Revenue ≥ 10 million RMB	Employees<5 OR Revenue<10 million RMB
Retail	Employees<1000 OR Revenue<400 million RMB	Employees ≥ 50 AND Revenue ≥ 5 million RMB	Employees ≥ 10 AND Revenue ≥ 1million RMB	Employees<10 OR Revenue<1 million RMB
Software and IT service	Employees<300 OR Revenue<100 million RMB	Employees ≥ 100 AND Revenue ≥ 10 million RMB	Employees ≥ 10 AND Revenue ≥ 0.5 million RMB	Employees<10 OR Revenue<0.5 million RMB

Source: Ministry of Industry and Information Technology (MIIT), National Bureau of Statistics, National Development and Reform Commission, Ministry of Finance, China (2011).

Appendix C

Table 4
Basic parameter analysis

		Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness	Kurtosis
OL	OL1	2	5	3.810	0.851	0.725	−0.077	−0.849
	OL2	2	5	3.760	0.870	0.757	−0.074	−0.834
	OL3	1	5	3.800	0.858	0.736	−0.243	−0.319
	OL4	1	5	3.720	0.907	0.823	−0.209	−0.637
	OL5	1	5	3.820	0.883	0.779	−0.338	−0.325
DC	DC1	1	7	4.760	1.550	2.404	−0.223	−0.516
	DC2	1	7	4.680	1.566	2.451	−0.164	−0.578
	DC3	1	7	4.620	1.582	2.503	−0.001	−0.748
	DC4	1	7	4.410	1.678	2.817	0.007	−0.819
CC	CC1	1	5	3.620	0.986	0.973	−0.307	−0.227
	CC2	1	5	3.620	0.962	0.925	−0.320	−0.163
	CC3	1	5	3.820	0.909	0.826	−0.356	−0.185
	CC4	1	5	3.570	0.987	0.975	−0.216	−0.370
EDC	EDC1	2	7	4.890	1.314	1.726	0.229	−0.917
	EDC2	1	7	4.790	1.329	1.767	0.217	−0.659
	EDC3	1	7	4.830	1.329	1.767	0.135	−0.625
	EDC4	1	7	4.780	1.385	1.918	−0.003	−0.560
	EDC5	1	7	4.730	1.411	1.990	0.099	−0.725
	EDC6	1	7	4.930	1.330	1.768	0.046	−0.716
EDP	EDP1	1	5	3.750	0.894	0.798	−0.272	−0.277
	EDP2	1	5	3.740	0.913	0.834	−0.345	−0.295
	EDP3	1	5	3.780	0.857	0.734	−0.203	−0.344
	EDP4	1	5	3.750	0.878	0.770	−0.297	−0.166
	EDP5	1	5	3.740	0.902	0.814	−0.352	−0.107
	EDP6	1	5	3.780	0.887	0.788	−0.363	−0.155

Appendix D

Table 5
path relation of moderating

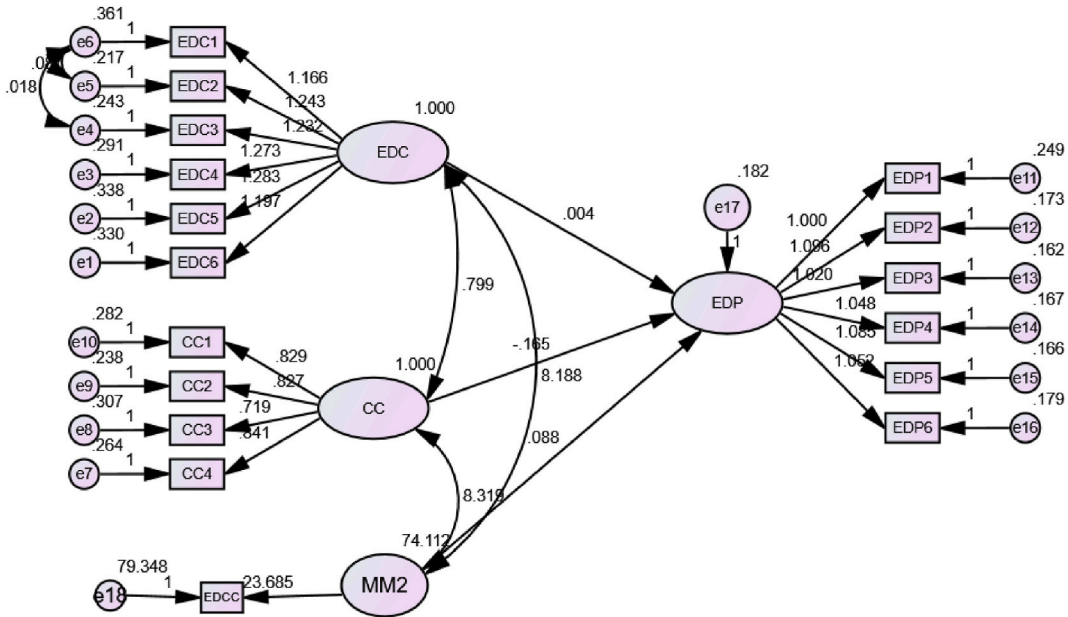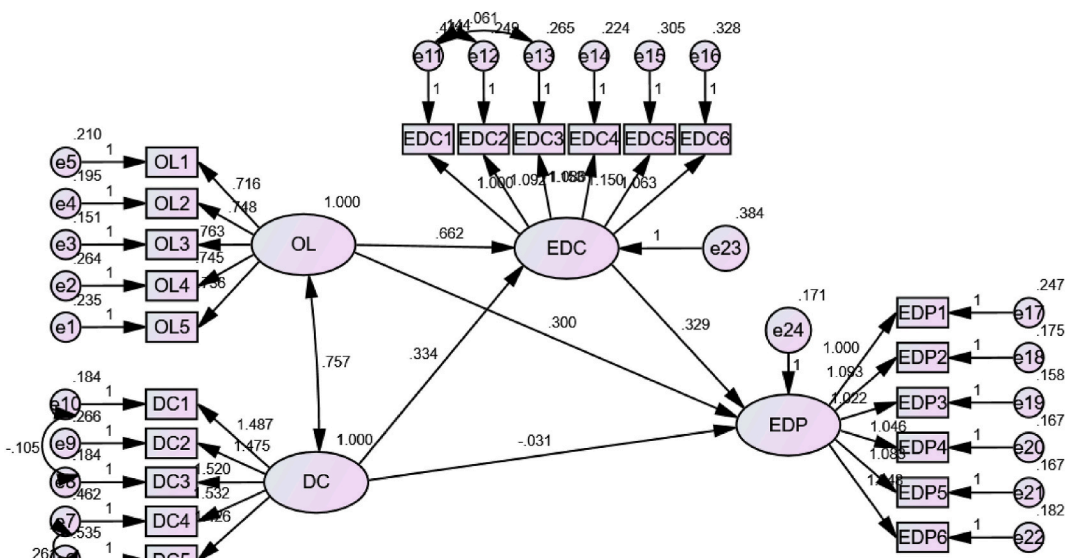| Path coefficient	Estimate	S.E.	C.R.	P
EDC→EDP	0.004	0.096	0.037	0.040
CC→EDP	−0.165	0.109	−1.795	0.043
Int → EDP	0.088	0.021	4.186	***

Fig. 3. Models of moderating variables

Appendix E

Fig. 4. Models of mediating variables
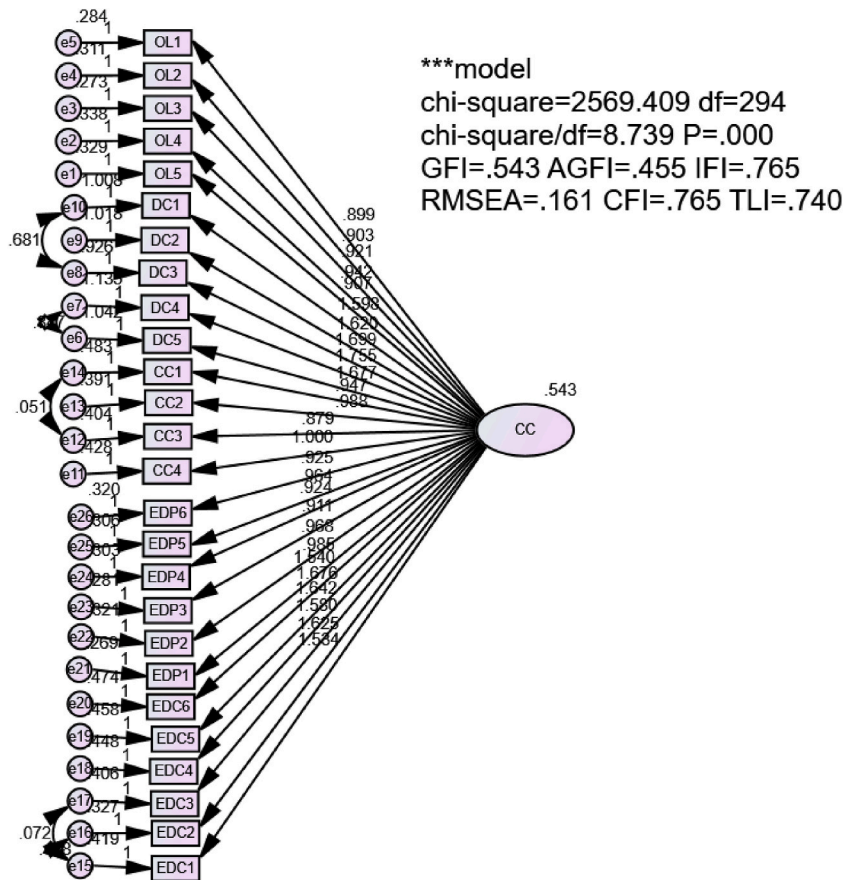
Fig. 5. Fitting the indicator model.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e25583.

References

[1] T. Moretta, G. Buodo, Z. Demetrovics, M.N. Potenza, Tracing 20 years of research on problematic use of the internet and social media: theoretical models, assessment tools, and an agenda for future work, Compr. Psychiatr. 112 (2022) 152286, https://doi.org/10.1016/j.comppsych.2021.152286.
[2] P.C. Verhoef, T. Broekhuizen, Y. Bart, A. Bhattacharya, J. Qi Dong, N. Fabian, et al., Digital transformation: a multidisciplinary reflection and research agenda, J. Bus. Res. 122 (2021) 889–901, https://doi.org/10.1016/j.jbusres.2019.09.022.
[3] A. Priyono, A. Moin, V.N.A.O. Putri, Identifying digital transformation paths in the business model of SMEs during the COVID-19 pandemic, Journal of Open Innovation: Technology, Market, and Complexity 6 (2020) 104, https://doi.org/10.3390/joitmc6040104.
[4] A. Melo DrI. Costa, G.A. Queiroz, P.N. Alves Junior, T.B.D. Sousa, W.F. Yushimito, J. Pereira, Sustainable digital transformation in small and medium enterprises (SMEs): a review on performance, Heliyon 9 (2023) e13908, https://doi.org/10.1016/j.heliyon.2023.e13908.
[5] M. Skare, M. De Las Mercedes De Obesso, S. Ribeiro-Navarrete, Digital transformation and European small and medium enterprises (SMEs): a comparative study using digital economy and society index data, Int. J. Inf. Manag. 68 (2023) 102594, https://doi.org/10.1016/j.ijinfomgt.2022.102594.
[6] A. Grigorescu, E. Pelinescu, A.E. Ion, M.F. Dutcas, Human capital in digital economy: an empirical analysis of central and eastern European countries from the European union, Sustainability 13 (2021) 2020, https://doi.org/10.3390/su13042020.
[7] N. Radziwill, Why digital transformations fail: the surprising disciplines of how to take off and stay ahead (Book Review): saldanha, T. 2019. Oakland CA: berrett-Koehler, 218 pages, Qual. Manag. J. 27 (2020), https://doi.org/10.1080/10686967.2020.1812988, 242–242.
[8] Z. Shao, X. Li, Y. Luo, J. Benitez, The differential impacts of top management support and transformational supervisory leadership on employees' digital performance, Eur. J. Inf. Syst. (2022) 1–27, https://doi.org/10.1080/0960085X.2022.2147456.
[9] X. Zhang, Y. Xu, L. Ma, Understanding the relationship between enterprise social media user adaptation, post-adoption use and employee performance, Behav. Inf. Technol. (2022) 1–19, https://doi.org/10.1080/0144929X.2022.2162437.
[10] F. Fu, W. Zha, Q. Zhou, The impact of enterprise digital capability on employee sustainable performance: from the perspective of employee learning, Sustainability 15 (2023) 12897, https://doi.org/10.3390/su151712897.
[11] A. Bieńkowska, A. Koszela, K. Tworek, Verification of the job performance model based on employees' dynamic capabilities in organisations under the COVID-19 pandemic crisis, Engineering Management in Production and Services 13 (2021) 66–85, https://doi.org/10.2478/emj-2021-0022.
[12] A. Bieńkowska, K. Tworek, Job performance model based on employees' dynamic capabilities (EDC), Sustainability 12 (2020) 2250, https://doi.org/10.3390/su12062250.

[13] J. Hirvonen, M. Majuri, Digital capabilities in manufacturing SMEs, Procedia Manuf. 51 (2020) 1283–1289, https://doi.org/10.1016/j.promfg.2020.10.179.

[14] E. Gemici, C. Zehir, High-performance work systems, learning orientation and innovativeness: the antecedent role of environmental turbulence, EJIM 26 (2023) 475–503, https://doi.org/10.1108/EJIM-05-2021-0243.

[15] A. Asija, D. Ringov, Dynamic capabilities: the role of board monitoring and managerial incentives, BRQ Business Research Quarterly 24 (2021) 268–280, https://doi.org/10.1177/2340944420916309.

[16] D. Ellström, J. Holtström, E. Berg, C. Josefsson, Dynamic capabilities for digital transformation, JSMA 15 (2022) 272–286, https://doi.org/10.1108/JSMA-04-2021-0089.

[17] R. Van De Wetering, J. Versendaal, Information technology ambidexterity, digital dynamic capability, and knowledge processes as enablers of patient agility: empirical study, JMIRx Med 2 (2021) e32336, https://doi.org/10.2196/32336.

[18] M.-S. Nemteanu, D.-C. Dabija, The influence of internal marketing and job satisfaction on task performance and counterproductive work behavior in an emerging market during the COVID-19 pandemic, IJERPH 18 (2021) 3670, https://doi.org/10.3390/ijerph18073670.

[19] P.H. Susananto, M. Arief, B. Usman, T. Tiarapuspa, Employee performance model based on e-HRM: employee green behavior as A performance indicator in the coal mining company, Jss 4 (2023) 16–29, https://doi.org/10.46799/jss.v4i1.459.

[20] JB. Barney, Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view, J Manage 27 (2001) 643–650, https://doi.org/10.1177/014920630102700602.

[21] M. Rodrigues, M. Franco, R. Silva, C. Oliveira, Success factors of SMEs: empirical study guided by dynamic capabilities and resources-based view, Sustainability 13 (2021) 12301, https://doi.org/10.3390/su132112301.

[22] D.J. Teece, Dynamic capabilities as (workable) management systems theory, J. Manag. Organ. 24 (2018) 359–368, https://doi.org/10.1017/jmo.2017.75.

[23] L. Li, F. Su, W. Zhang, J.-Y. Mao, Digital transformation by SME entrepreneurs: a capability perspective, Inf. Syst. J. 28 (2018) 1129–1157, https://doi.org/10.1111/isj.12153.

[24] K.S.R. Warner, Building dynamic capabilities for digital transformation_ an ongoing process of strategic renewal, Long. Range Plan 52 (2019) 326–349, https://doi.org/10.1016/j.lrp.2018.12.001.

[25] S. Chen, J. Zheng, Influence of organizational learning and dynamic capability on organizational performance of human resource service enterprises: moderation effect of technology environment and market environment, Front. Psychol. 13 (2022) 889327, https://doi.org/10.3389/fpsyg.2022.889327.

[26] S. Joensuu-Salo, M. Matalamäki, The impact of digital capability on firm performance and growth in incumbent SMEs, J. Enterprising Cult. (2023) 1–22, https://doi.org/10.1142/S0218495823500073.

[27] S. Chen, J. Zheng, Influence of organizational learning and dynamic capability on organizational performance of human resource service enterprises: moderation effect of technology environment and market environment, Front. Psychol. 13 (2022) 889327, https://doi.org/10.3389/fpsyg.2022.889327.

[28] S. Kang, S.A. Snell, Intellectual capital architectures and ambidextrous learning: a framework for human resource management, J. Manag. Stud. 46 (2009) 65–92, https://doi.org/10.1111/j.1467-6486.2008.00776.x.

[29] X. Zhu, S. Yu, S. Yang, Leveraging resources to achieve high competitive advantage for digital new ventures: an empirical study in China, Asia Pac. Bus. Rev. 29 (2023) 1079–1104, https://doi.org/10.1080/13602381.2022.2015955.

[30] R. Rupeika-Apoga, K. Petrovska, L. Bule, The effect of digital orientation and digital capability on digital transformation of SMEs during the COVID-19 pandemic, JTAER 17 (2022) 669–685, https://doi.org/10.3390/jtaer17020035.

[31] I. Giotopoulos, A. Kontolaimou, E. Korra, A. Tsakanikas, What drives ICT adoption by SMEs? Evidence from a large-scale survey in Greece, J. Bus. Res. 81 (2017) 60–69, https://doi.org/10.1016/j.jbusres.2017.08.007.

[32] M. Matarazzo, L. Penco, G. Profumo, R. Quaglia, Digital transformation and customer value creation in Made in Italy SMEs: a dynamic capabilities perspective, J. Bus. Res. 123 (2021) 642–656, https://doi.org/10.1016/j.jbusres.2020.10.033.

[33] K. Tworek, A. Bieńkowska, L. Hawrysz, J. Maj, The model of organizational performance based on employees' dynamic capabilities–verification during crisis caused by black swan event, IEEE Access 11 (2023) 45039–45055, https://doi.org/10.1109/ACCESS.2023.3273608.

[34] J. Benitez, A. Arenas, A. Castillo, J. Esteves, Impact of digital leadership capability on innovation performance: the role of platform digitization capability, Inf. Manag. 59 (2022) 103590, https://doi.org/10.1016/j.im.2022.103590.

[35] S. Khin, T.C. Ho, Digital technology, digital capability and organizational performance: a mediating role of digital innovation, IJIS 11 (2019) 177–195, https://doi.org/10.1108/IJIS-08-2018-0083.

[36] A. Yeow, C. Soh, R. Hansen, Aligning with new digital strategy: a dynamic capabilities approach, J. Strat. Inf. Syst. 27 (2018) 43–58, https://doi.org/10.1016/j.jsis.2017.09.001.

[37] J.R. Meher, R.K. Mishra, Examining the role of knowledge sharing on employee performance with a mediating effect of organizational learning, VJIKMS 52 (2022) 205–223, https://doi.org/10.1108/VJIKMS-04-2020-0056.

[38] F. Fu, W. Zha, Q. Zhou, The impact of enterprise digital capability on employee sustainable performance: from the perspective of employee learning, Sustainability 15 (2023) 12897, https://doi.org/10.3390/su151712897.

[39] G. Gomes, R.M. Wojahn, Organizational learning capability, innovation and performance: study in small and medium-sized enterprises (SMES), Rev. Adm. 52 (2017) 163–175, https://doi.org/10.1016/j.rausp.2016.12.003.

[40] M. Muniroh, H. Hamidah, T. Abdullah, Managerial implications on the relation of digital leadership, digital culture, organizational learning, and innovation of the employee performance (case study of pt. telkom digital and next business department), Management and Entrepreneurship: Trends of Development 1 (2022) 58–75, https://doi.org/10.26661/2522-1566/2022-1/19-05.

[41] Q. Iqbal, N.H. Ahmad, Sustainable development: the colors of sustainable leadership in learning organization, Sustain. Dev. 29 (2021) 108–119, https://doi.org/10.1002/sd.2135.

[42] L. Blaique, H.N. Ismail, H. Aldabbas, Organizational learning, resilience and psychological empowerment as antecedents of work engagement during COVID-19, IJPPM 72 (2023) 1584–1607, https://doi.org/10.1108/IJPPM-04-2021-0197.

[43] J.A. Wali, R. Muthuveloo, T.A. Ping, M. Bataineh, An Overview of Employees' Dynamic Capabilities, Job Performance with Innovative Work Behavior: A Conceptual Paper. Dynamic Capabilities, 2020.

[44] C. Baumann, H. Hamin, R.L. Tung, S. Hoadley, Competitiveness and workforce performance: asia *vis-à-vis* the "West.", IJCHM 28 (2016) 2197, https://doi.org/10.1108/IJCHM-12-2014-0617. –217.

[45] I. Kulkova, M. Litvinenko, Employees' competitiveness assessment during the skills development to improve the territories sustainability, E3S Web Conf 208 (2020) 03016, https://doi.org/10.1051/e3sconf/202020803016.

[46] S.J. Yang, The Effect of Competitiveness on Performance: Investigating Antecedents and n.D, 2023.

[47] O. Turel, F. Gaudioso, Techno-stressors, distress and strain: the roles of leadership and competitive climates, Cognit. Technol. Work 20 (2018) 309–324, https://doi.org/10.1007/s10111-018-0461-7.

[48] A. Markovich, K. Efrat, D.R. Raban, Dynamic capabilities: interrelations and distinct effects on performance in low and high competitive intensity environments, BJM 16 (2021) 539–563, https://doi.org/10.1108/BJM-10-2020-0367.

[49] T. Koutroukis, D. Chatzinikolaou, C. Vlados, V. Pistikou, The post-COVID-19 era, fourth industrial revolution, and new globalization: restructured labor relations and organizational adaptation, Societies 12 (2022) 187, https://doi.org/10.3390/soc12060187.

[50] P. Mikalef, M. Boura, G. Lekakos, J. Krogstie, Big data analytics capabilities and innovation: the mediating role of dynamic capabilities and moderating effect of the environment, Br. J. Manag. 30 (2019) 272–298, https://doi.org/10.1111/1467-8551.12343.

[51] S. Shan, Y. Luo, Y. Zhou, Y. Wei, Big data analysis adaptation and enterprises' competitive advantages: the perspective of dynamic capability and resource-based theories, Technol. Anal. Strat. Manag. 31 (2019) 406–420, https://doi.org/10.1080/09537325.2018.1516866.

[52] M. Nasiri, J. Ukko, M. Saunila, T. Rantala, H. Rantanen, Digital-related capabilities and financial performance: the mediating effect of performance measurement systems, Technol. Anal. Strat. Manag. 32 (2020) 1393–1406, https://doi.org/10.1080/09537325.2020.1772966.

[53] Y. Herwina, The influence of competence on employee performance: investigation of automotive companie, IJMBA 1 (2022) 1–8, https://doi.org/10.54099/ijmba.v1i1.97.

[54] K. Lu,) Ramamurthy Ram, Understanding the link between information technology capability and organizational agility: an empirical examination, MIS Q. 35 (2011) 931, https://doi.org/10.2307/41409967.

[55] N. Zahoor, F. Donbesuur, M. Christofi, D. Miri, Technological innovation and employee psychological well-being: the moderating role of employee learning orientation and perceived organizational support, Technol. Forecast. Soc. Change 179 (2022) 121610, https://doi.org/10.1016/j.techfore.2022.121610.

[56] H.T.T. Nguyen, H.S.T. Pham, S. Freeman, Dynamic capabilities in tourism businesses: antecedents and outcomes, Rev Manag Sci 17 (2023) 1645–1680, https://doi.org/10.1007/s11846-022-00567-z.

[57] K.A. Robinson, I.J. Saldanha, N.A. Mckoy, Development of a framework to identify research gaps from systematic reviews, J. Clin. Epidemiol. 64 (2011) 1325–1330, https://doi.org/10.1016/j.jclinepi.2011.06.009.

[58] M.I. Hendri, The mediation effect of job satisfaction and organizational commitment on the organizational learning effect of the employee performance, IJPPM 68 (2019) 1208–1234, https://doi.org/10.1108/IJPPM-05-2018-0174.

[59] J.R. Meher, R.K. Mishra, Examining the role of knowledge sharing on employee performance with a mediating effect of organizational learning, VJIKMS 52 (2022) 205–223, https://doi.org/10.1108/VJIKMS-04-2020-0056.

[60] S. Imani, P. Foroudi, N. Seyyedamiri, N. Dehghani, Improving employees' performance through internal marketing and organizational learning: mediating role of organizational innovation in an emerging market, Cogent Business & Management 7 (2020) 1762963, https://doi.org/10.1080/23311975.2020.1762963.

[61] C. Blanka, B. Krumay, D. Rueckel, The interplay of digital transformation and employee competency: a design science approach, Technol. Forecast. Soc. Change 178 (2022) 121575, https://doi.org/10.1016/j.techfore.2022.121575.

[62] M. Farzaneh, P. Ghasemzadeh, J.A. Nazari, G. Mehralian, Contributory role of dynamic capabilities in the relationship between organizational learning and innovation performance, EJIM 24 (2021) 655–676, https://doi.org/10.1108/EJIM-12-2019-0355.

[63] S. Durst, I. Heinze, T. Henschel, N. Nawaz, Unlearning: a systematic literature review, IJBG 24 (2020) 472, https://doi.org/10.1504/IJBG.2020.106959.

[64] J. Shin, M.A. Mollah, J. Choi, Sustainability and organizational performance in South Korea: the effect of digital leadership on digital culture and employees' digital capabilities, Sustainability 15 (2023) 2027, https://doi.org/10.3390/su15032027.

[65] W. Nandini, A. Gustomo, D. Sushandoyo, The mechanism of an individual's internal process of work engagement, active learning and adaptive performance, Economies 10 (2022) 165, https://doi.org/10.3390/economies10070165.

[66] R.Y.Y. Hung, B. Yang, -H. Lien By, G.N. McLean, Y.-M. Kuo, Dynamic capability: impact of process alignment and organizational learning culture on performance, J. World Bus. 45 (2010) 285–294, https://doi.org/10.1016/j.jwb.2009.09.003.

[67] M. Garmaki, R.K. Gharib, I. Boughzala, Big data analytics capability and contribution to firm performance: the mediating effect of organizational learning on firm performance, JEIM 36 (2023) 1161–1184, https://doi.org/10.1108/JEIM-06-2021-0247.

[68] P. Pollok, D. Lüttgens, F.T. Piller, How firms develop capabilities for crowdsourcing to increase open innovation performance: the interplay between organizational roles and knowledge processes, J. Prod. Innovat. Manag. 36 (2019) 412–441, https://doi.org/10.1111/jpim.12485.

[69] M. Bornay-Barrachina, Á. López-Cabrales, A. Salas-Vallina, Sensing, seizing, and reconfiguring dynamic capabilities in innovative firms: why does strategic leadership make a difference? BRQ Business Research Quarterly (2023) 23409444231185790 https://doi.org/10.1177/23409444231185790.

[70] X.T. Phan, H.N. Ngo, T.L. Nguyen, D.T. Pham, N.C. Truong, N.A. Pham, et al., The effects of dynamic employee capabilities, fintech and innovative work behavior on employee and supply chain performance: Evidence from Vietnamese financial industry 10 (2022) 1305–1314, https://doi.org/10.5267/j.uscm.2022.7.009, 105267/jUscm.

[71] J. Al Wali, R. Muthuveloo, A.P. Teoh, W. Al Wali, Disentangling the relationship between employees' dynamic capabilities, innovative work behavior and job performance in public hospitals, IJIS 15 (2023) 368–384, https://doi.org/10.1108/IJIS-01-2022-0012.

[72] C.L. Wang, C. Senaratne, M. Rafiq, Success traps, dynamic capabilities and firm performance, Br. J. Manag. 26 (2015) 26–44, https://doi.org/10.1111/1467-8551.12066.

[73] A. Pezeshkan, S. Fainshmidt, A. Nair, M. Lance Frazier, E. Markowski, An empirical assessment of the dynamic capabilities–performance relationship, J. Bus. Res. 69 (2016) 2950–2956, https://doi.org/10.1016/j.jbusres.2015.10.152.

[74] C.C. Bitencourt, F. De Oliveira Santini, W.J. Ladeira, A.C. Santos, E.K. Teixeira, The extended dynamic capabilities model: a meta-analysis, Eur. Manag. J. 38 (2020) 108–120, https://doi.org/10.1016/j.emj.2019.04.007.

[75] G. Luo, K. Tworek, A.S. E-Leadership, A booster of employees' dynamic capabilities influence on job performance, Dynamic Capabilities 31 (2023) 237–248, https://doi.org/10.29119/1641-3466.2022.155.16.

[76] H. Wang, L. Wang, C. Liu, Employee competitive attitude and competitive behavior promote job-crafting and performance: a two-component dynamic model, Front. Psychol. 9 (2018) 2223, https://doi.org/10.3389/fpsyg.2018.02223.

[77] X.M. Xie, S.X. Zeng, C.M. Tam, Overcoming barriers to innovation in SMEs in China: a perspective-based cooperation network, Innovation 12 (2010) 298–310, https://doi.org/10.5172/impp.12.3.298.

[78] D. Hooper, J. Couglan, M.R. Mullen, Structural Equation Modelling: Guidelines for Determining Model FIt n.D, 2023.

[79] H. Zahoor, A.P.C. Chan, W.P. Utama, R. Gao, S.A. Memon, Determinants of safety climate for building projects: SEM-based cross-validation study, J. Construct. Eng. Manag. 143 (2017) 05017005, https://doi.org/10.1061/(ASCE)CO.1943-7862.0001298.

[80] P.M. Bentler, P. Dudgeon, Covariance structure analysis: statistical practice, theory, and directions, Annu. Rev. Psychol. 47 (1996) 563–592, https://doi.org/10.1146/annurev.psych.47.1.563.

[81] R.P. Bagozzi, Y. Yi, Specification, evaluation, and interpretation of structural equation models, J. Acad. Market. Sci. 40 (2012) 8–34, https://doi.org/10.1007/s11747-011-0278-x.

[82] R.A. Ping, A parsimonious estimating technique for interaction and quadratic latent variables, J. Market. Res. 32 (1995) 336–347, https://doi.org/10.1177/002224379503200308.

[83] L. Hu, P.M. Bentler, Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives, Struct. Equ. Model.: A Multidiscip. J. 6 (1999) 1–55, https://doi.org/10.1080/10705519909540118.

[84] A.F. Hayes, N.J. Rockwood, Regression-based statistical mediation and moderation analysis in clinical research: observations, recommendations, and implementation, Behav. Res. Ther. 98 (2017) 39–57, https://doi.org/10.1016/j.brat.2016.11.001.

[85] A.B. Taylor, D.P. MacKinnon, J.-Y. Tein, Tests of the three-path mediated effect, Organ. Res. Methods 11 (2008) 241–269, https://doi.org/10.1177/1094428107300344.

[86] R. Hernández-Linares, F.W. Kellermanns, M.C. López-Fernández, Dynamic capabilities and SME performance: the moderating effect of market orientation, J. Small Bus. Manag. 59 (2021) 162–195, https://doi.org/10.1111/jsbm.12474.

[87] M. Kordab, J. Raudeliūnienė, I. Meidutė-Kavaliauskienė, Mediating role of knowledge management in the relationship between organizational learning and sustainable organizational performance, Sustainability 12 (2020) 10061, https://doi.org/10.3390/su122310061.

[88] M.A. Mollah, J.-H. Choi, S.-J. Hwang, J.-K. Shin, Exploring a pathway to sustainable organizational performance of South Korea in the digital age: the effect of digital leadership on IT capabilities and organizational learning, Sustainability 15 (2023) 7875, https://doi.org/10.3390/su15107875.

[89] J. Guo, S. Zhou, J. Chen, Q. Chen, How information technology capability and knowledge integration capability interact to affect business model design:A polynomial regression with response surface analysis, Technol. Forecast. Soc. Change 170 (2021) 120935, https://doi.org/10.1016/j.techfore.2021.120935.

[90] M.-T. Bui, H.-L. Le, Digital capability and creative capability to boost firm performance and formulate differentiated CSR-based strategy, Heliyon 9 (2023) e14241, https://doi.org/10.1016/j.heliyon.2023.e14241.

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