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RESEARCH ARTICLE

A comprehensive mixed-methods study on cross-border e-commerce SMEs, digital transformation and dynamic managerial capabilities

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ABSTRACT

The development of the digital trade ecosystem heavily relies on the expansion of cross-border e-commerce (CBEC) platforms. CBEC companies are actively involved in digital transformation (DT) initiatives to bolster their core competencies and market share. E-commerce has experienced rapid growth in recent years, particularly since the global market faced significant disruptions due to the COVID-19 pandemic in 2020. As the market continues to globalize, more Chinese entrepreneurs are shifting their focus towards the international arena. They aim to increase investments in high-tech productivity within their organizations while also concentrating on enhancing their dynamic managerial capabilities to drive transformation within cross-border e-commerce companies. Therefore, the current study examines how organizational DT impacts the management capabilities of Chinese cross-border e-commerce managers from the perspective of dynamic managerial capabilities. The research employed a mixed-method approach. Firstly, a bibliometric analysis was conducted using VOS Viewer and R studio. Data was collected from two databases, Web of Science and Scopus, to analyze publication trends across countries and identify journals with the highest number of publications and citations. This analysis aimed to provide a comprehensive understanding of the context of the subject. Secondly, seven in-depth interviews were conducted using purposive and chain-referral sampling techniques, drawing insights from CEOs based on their real-life experiences with organizational DT. The results of the study revealed that technology has led to the decentralization and flattening of organizational structures. Managers are increasingly using social platforms to connect with experts and potential collaborators. Furthermore, the study highlights the role of psychological support in bolstering dynamic managerial capabilities.

Keywords: digital transformation; dynamic managerial capabilities; organizational structure; innovation

1. Introduction

Cross-border e-commerce (CBEC) represents a contemporary facet of global trade in the realm of digital commerce[1]. It encompasses the utilization of electronic commerce platforms and the digital transformation of traditional trade connections to facilitate transactions between businesses situated in different countries[2,3]. CBEC primarily aims to leverage various elements of logistics, marketing, payment systems, public services,

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and other economic activities associated with import and export trade to stimulate the expansion of production and manufacturing[4,5]. The evolution of CBEC in China has progressed from its initial phase, characterized by transactional firms and trading platforms as central actors, to a more mature intermediate stage. During this intermediate phase of CBEC growth, digital technologies play a prominent role in facilitating various online business processes, including sales and transactions[6,7]. Organizations rely on telecommunication-oriented technologies, such as the internet, to conduct these operations[8]. Several factors contribute to this phenomenon, including discerning customers who exert pressure on enterprises to enhance their online purchasing platforms to meet their demands[1]. It is crucial to recognize that the proliferation of electronic commerce has fostered the development of prominent retail platforms like Jingdong (JD.com) and Alibaba (Alibaba.com). The diverse nature of online businesses has led to the creation of various categorizations that delineate cross-border e-commerce from multiple perspectives. These categorizations include business-to-business (B2B), business-to-consumer (B2C), consumer-to-consumer (C2C), and government-to-business/consumer (G2B/G2C)[7].

Much like the manufacturing industry, the service sector has emerged as a significant driving force in China's aspiration to establish itself as a global trade leader. The Fourteenth Five-Year Plan for National Economic and Social Development of the People's Republic of China, as well as the vision for 2035, places strong emphasis on the vital importance of promoting the integrated development of the producer service industry, with a particular focus on enhancing the overall industry chain's advantages[5,9]. To realize this vision, it is essential to boost the efficiency of several key elements, which encompass modern logistics, procurement, distribution, production control, operational management, and after-sales service. Encouraging the fusion of modern service industries with advanced manufacturing and contemporary agriculture is of paramount significance. Additionally, nurturing service enterprises with the capability for global competitiveness is a fundamental requirement.

E-commerce and digital transformation (DT), which is the focus of the current study, is the most sophisticated topic which has gained much attention among scholars[10]. Digital transformation has been defined as a tool for altering existing business processes, improving customer experience and value to businesses[3]. For instance, new online mobile applications have provided a completely new platform to its customers for interaction with the company which was totally different earlier. DT is an iterative and transformative process that organizations undergo to adapt to the changing environment and to customer needs. It involves redefining the organization's business model and strategic objectives by leveraging digital technologies in various areas[11]. The COVID-19 global pandemic has accelerated the need for DT, resulting in managers and employees facing isolation and remote work conditions[12]. DT can thus help organizations maintain a competitive advantage in the post-pandemic market by enhancing their performances, human resource management, and executive capabilities.

Most scholars agree that digital technologies should act as a dual engine for organizational development as follows[9]. With an industrial value added of RMB 37.3 trillion in 2021, China's industrial manufacturing industry has provided a relevant foundation for the development of CBEC. This has resulted in an increase in the business income and total profits of Chinese e-commerce by 19.9% and 25.6% year-on-year, respectively. However, in 2022, many Chinese e-commerce faced increased cost pressures due to higher raw material prices in international markets and lower domestic market demand due to the pandemic, which slowed down their DT pace. To support e-commerce in deepening their DT and enhancing their comprehensive strengths and core competitiveness, the General Office of the State Ministry of Industry and Information Technology of China issued a "Digital transformation guide for SMEs" in 2022 to provide guidance to enterprises in achieving DT. Both academics and practitioners have also started to pay attention to the role of managers in

implementing the DT process.

Following the increasing attention paid to DT, some studies have examined how companies and managers in emerging industries adapt to the changes brought by this process to improve their internal management capabilities for strategic transformation and success[2,3]. Other studies have discussed the role and importance of top management in the DT journey of a firm. They have also emphasized that top management needs to enhance their awareness of digital technologies, adaptability to the rapidly changing external environment, and leadership skills to cope with the changes caused by DT implementation in their organization. However, there is a lack of research on how managers, especially senior ones, should maintain and improve their dynamic management capabilities to drive the transformational growth and profitability of the organization in the face of ever-changing technological and competitive challenges[9]. Therefore, the current study explored the impact of the dynamic managerial capability of top managers on the performance and strategic direction of e-commerce in the developing digital environment. Furthermore, we built on existing research on the development of managerial competencies and the role of third-party platforms in the implementation of DT. The current study highlighted the importance of managing cognitive capabilities and social capital and emphasizes the need for top managers to adopt activities that promote business models, organizational performance, technology, and strategic management during DT.

The manuscript is structured as follows: Section 1 provides a brief introduction regarding the role of digital transformation and dynamic managerial capabilities and their impact on CBEC business. Section 2 elucidates the theoretical background of the study. In section 3, we detail the research methodology employed in this work. Section 4 reports our major findings and presents the conceptual framework derived from the literature, which highlights the evolving requirements of dynamic managerial capabilities for top managers and their influence on organizational performance and strategic development. To conclude, section 5 offers a summary of the work, addressing limitations encountered during the research process and suggesting directions for future research.

Research objectives

(1) To understand why digital transformation is essential for SMEs level cross-border e-commerce businesses.
(2) To examine the how dynamic managerial capabilities enhanced the performance of cross-border e-commerce businesses.
(3) To explain the how dynamic managerial capabilities improved organizational digital transformation and performance.

2. Theoretical backgrounds

2.1. Digital transformation for cross-border e-commerce SMEs

Digitalization refers to the use and development of digital information technology. It enables rapid growth and breakthroughs for the organization to become more competitive[10]. It also has a significant impact on the internal structure, strategic deployment, and global resource allocation of organizations[13]. Over the past two decades, many academics have been interested in the DT process and studied its various aspects. For example, some have examined the processes and models of organizational transformation[7], while others have explored the resource and capability requirements of organizations undergoing DT[14], the impact of DT on organizational performance, and the role and future trends of DT in the internal and external environment of organizations[3].

New digital technologies such as big data analytics, artificial intelligence, and holographic projection

technologies are transforming the business models of enterprises across industries and business production or services[15]. Therefore, some studies have highlighted the importance of changes in the way new markets interact with customers and the value exchange enabled by digital technologies[8]. Researchers found that digitalization reduces the communication distance between companies and consumers and allows companies to understand and customize their products and services according to customer needs by using big data analysis[16]. In terms of business models, extant studies have found that the widespread use of mobile Internet technologies has changed the business models of organizations undergoing DT, especially their relationships with and value propositions for customers[17]. Namely, employees can stay connected to customers anytime and anywhere through mobile devices and improve the quality of customer relationship management services for their companies. Moreover, some studies have argued that the development of applications and platforms provides a broader and more attractive market for companies to explore new business opportunities in the market[12].

From the organizational innovation perspective, many studies have shown that digital technologies have a positive impact on firms' innovation capabilities, especially in the case of cross-border e-commerce SMEs[1,2,12]. This is because SMEs use information and digital technologies extensively in both high-tech and traditional industries, which enables them to pursue opportunities in new markets and enhance their organizational performance[18]. E-commerce has grown rapidly in recent years, especially since the tremendous turmoil faced by the global market due to the COVID-19 pandemic in 2020. Many SMEs are thus actively trying to expand their sales through e-commerce platforms in the post-pandemic era, as these platforms provide traditional retailers with more customer resources and information; social media adds new ways of interaction; and mobile payments, big data analytics, and AI technology create new value propositions for businesses. These digital technologies support the development of SME products and services in new markets and make them competitive. Extensive research has focused on how organizations can seize opportunities to enter new markets and access new opportunities through DT. However, fewer studies have examined the role of human capital and if managers, especially the CEOs of SMEs, are aware of the importance of DT in their organizations and how they should implement DT in every aspect of production, management, and sales. Hence, this study answers these questions by conducting a qualitative analysis of SME executives in China.

2.2. Role of dynamic managerial capabilities in cross-border e-commerce SMEs

Dynamic management capability (DMC) is defined as the ability of managers to create, integrate, and reconfigure resources on an organizational basis[19]. Some scholars have extended this concept and argued that it affects not only the internal attributes of the organization but also the external environment[20]. Others have enriched the functions of DMC and suggested that it should include the abilities of managers to search, select, invest, coordinate, and reallocate resources; asset coordination also implies that the cross-border e-commerce SMEs creates value by developing and bundling all its assets so that it can adapt to the changing conditions within its industry[21]. Furthermore, scholars have emphasized that e-commerce managers should show the necessary responsiveness to changing technologies and markets within their industries and have the autonomy to decide whether to exploit change[18]. Teece[22] highlighted the role of executives in DMC, especially in entrepreneurial and creative management activities where "their actions are by nature strategic." Similarly, Martin[23] stated that top managers foster creativity and innovation within their organizations through their abilities to perceive and seize opportunities. Therefore, based on the framework of "asset coordination" and related studies, it can be inferred that DMC involves three aspects: (1) perceiving opportunities and threats; (2) seizing opportunities to act, invest, and deploy resources; and (3) possessing a DMC for senior managers to seize opportunities for strategic growth in a changing technological and market

environment. DMC refers to the ability to continuously learn, integrate, and reconfigure resources through agile and flexible organizational structures. Previous studies have shown that it plays a key role in strategic renewal and resource reconfiguration and entrepreneurship[24]. Moreover, Hossain et al.[25] suggested that entrepreneurs can create new markets and opportunities by reconfiguring organizational resources, thus linking DMC with entrepreneurship. Based on the above literature review, we argue that DMC is built on three foundational management resources, namely managerial cognition, managerial social capital, and managerial human capital.

Managerial cognition refers to the knowledge structures, mental processes or activities, and emotions that managers use to make sense of and act on their environment. Knowledge structures are the mental representations of managers of their information world. They can be heuristic, meaning they help managers anticipate and respond to technological and market changes. However, knowledge structures can also be difficult to transfer when the environment changes[26]. Therefore, managers need to make connections between knowledge structures in different contexts, which enable them to perceive new market opportunities from distant regions. Moreover, research has shown that managers' ability to transfer knowledge increases when the environment is dynamic[21]. Mental processes or activities are the cognitive skills that managers employ to perform managerial tasks. They include attention, perception, problem-solving, and communication with others, being essential for managerial cognition. Emotions are the affective states that influence managers' cognition and behavior[17]. Managers need to regulate their own emotions and affect the emotions of others in their organization.

Managerial social capital refers to the resources and information that manager's access through their formal or informal work relationships. These resources and information can help them perceive the market better and seize opportunities. Managerial human capital refers to the knowledge and skills that managers acquire through education, training, and experience. It also includes psychological attributes such as personality, values, and interests, which affect managers' performance[18]. We define human capital as the core characteristics of an individual that include knowledge, skills, experience, and education. Managerial human capital is relevant to the organization and leads to improved organizational outcomes.

The above literature review suggests that senior managers with excellent DMC are more likely to achieve strategic change in their cross-border e-commerce SMEs. Therefore, we focus on traditional companies undergoing DT and show that the development of entrepreneurial DMCs could accelerate DT and organizational performance growth. By perceiving new technologies and markets during DT and using evolving information technology to enable social and human capital, top managers can seize new opportunities and leverage them for the organizational benefit and strategic change. We also show that DT processes in organizations drive managerial change within the organization. Top managers need to transform their management capabilities to adapt to the changing external environment. Moreover, the transformation of managers' DMC influences organizational transformation. The literature on intra-organizational DT focuses on changes in an organization's business model, structural model, and operational processes, and shows how digital technologies enable transformation and value creation. To deepen this perspective, we explore how senior managers use their dynamic management capabilities to implement DT in their organizations and how DMC enhancement affects the future growth strategies and transformation of an organization.

3. Research methodology

3.1. Bibliometric analysis

This research employs a mixed-method approach, commencing with a bibliometric analysis that specifically focuses on cross-border small and medium enterprises (SMEs) engaged in electronic commerce. The analysis delves into the impact of digital transformation and dynamic management capabilities on these enterprises. It primarily utilizes two prominent databases, namely Scopus and Web of Science (WoS), with the intention of encompassing high-quality papers. The journals incorporated in this analysis include those indexed in the "Emerging Sources Citation Index," the "Social Sciences Citation Index," the "Science Citation Index Expanded," the "Science Citation Index," and the "CPCI-SSH." The temporal scope of this inquiry spans from the year 2000 through 2023. The bibliometric method is employed for data analysis and acquisition. Scopus and Web of Science (WoS) are recognized as the primary repositories for peer-reviewed research in the social sciences, offering comprehensive coverage. These databases are extensively utilized in empirical and quantitative investigations within the academic community[27].

Bibliometric research serves the purpose of quantifying the contributions of authors, nations, publication numbers, and citation counts associated with a specific subject, as evident in the existing literature[28]. Additionally, our study adopts a grounded and inductive research approach, utilizing qualitative data to construct theory through an inductive method, as recommended by Maia et al.[27]. In the bibliometric analysis, relevant publications are identified by combining keywords using Boolean operators, such as AND and OR. A search query employing the phrase "cross-border e-commerce" yielded a total of 372,521 search results. Subsequently, the initial sample yielded five distinct keywords frequently used in article titles, strongly associated with the field of CBEC. A more refined exploration of the extensive array of concepts, the search query including ("digital transformation" OR "dynamic management skills" OR "organizational structure" OR "innovation" AND "cross-border e-commerce"), led to the identification of 2272 scholarly publications.

This research was facilitated through the utilization of VOS Viewer (version 1.6.18) and the R software (version 4.2.2). VOS Viewer was employed to analyze the network of author collaborations and the interconnections between cross-border e-commerce topics, visually presenting the results[29]. The study was programmed using the statistical computing language R and then viewed within the VOS Viewer. The search queries, which serve as the representation of the inclusion criteria, are intrinsically aligned with the study's objectives, scope, research gaps, and research questions. Moreover, only publications initially published in English were taken into account. The search encompassed articles, book chapters, and conference papers from the period 2000 to 2023. As of 10 September 2023, there were a total of 2271 works authored by 4608 individuals on the subject of cross-border e-commerce. The selected articles have been summarized in **Table 1**.

With predetermined input data, VOS Viewer generates a visual representation of cited works, as demonstrated in studies by El Mohadab et al.[29] and McNicholas et al.[28]. Several bibliometric techniques, including BC, co-citation analysis, and keyword frequency analysis, are applied to scrutinize the data. A BC citation takes place when two authors, A and B, both reference a work by a third author, C. Co-citation, on the other hand, occurs when a single document cites two distinct sources, such as when study C references both study A and study B. The co-occurrence of two or more keywords within the same article is determined based on the frequency with which they appear together.

Table 1. Article selection summary.

Description	Results
Main information about data	
Timespan	2008:2023
Sources (journals, book chapters, review papers)	1196
Documents	2271
Annual growth rate %	8.68
Document average age	5.17
Average citations per doc	8.196
References	75,675
Document contents	
Keywords plus (ID)	6805
Author's keywords (DE)	5542
Authors	
Authors	4608
Authors of single-authored docs	449
Authors collaboration	
Single-authored docs	489
Co-authors per doc	2.53
International co-authorships %	14.71
Document types	
Article	1055
Book chapter	234
Conference paper	197
Review paper	792

3.2. Semi-structured interviews

Based on the findings of the bibliometric analysis, the present study conducted semi-structured interviews to gather pertinent data for the verification of its research questions. This empirical study is grounded in seven in-depth interviews, employing two distinct sampling methods. The first method is purposive sampling, which establishes predetermined criteria and selects respondents based on the study's content and research questions. The second method is the chain-referral sampling technique, which leverages recommendations from previously selected respondents and can be considered a variant of purposive sampling. The criteria set for the selection of respondents encompass four fundamental aspects from the following dimensions: geography, firm size, firm status, and respondent experience.

First, Pearl River Delta region of China was selected as the sampling location. This region is the main area of legacy business and processing in China and has many cross-border e-commerce SMEs, which minimizes regional or social differences. Second, this study focuses on cross-border e-commerce of SMEs level; due to their complexity and variability, we set the company size criteria at 30–100 employees, including production and sales staff. Third, we collected data from mature companies that were not DT start-ups and had at least 8 years of CBEC experience. The senior executives we interviewed had some DT knowledge and skills and were responsible for their businesses. We ensured moderate variability among respondents by varying the industry and competitive position. **Table 2** describes the firms and respondents in

our study.

Table 2. Firms and respondents.

Firm	City	Product	Founded	Number of employees	Interviewee position
AP	SZ	Car speed meter	Before 2007	89	Founder
PS	DG	Pet plush blanket	2014	37	Head of sales department
CC	DG	Children's clothing	2012	75	CEO
CP	SZ	Video card	2013	30	CEO
HC	DG	Hat	2009	94	Founder
YC	DG	Yoga clothing	2012	66	Head of sales department
PT	SZ	Plastic toys	2008	48	CEO

Note. SZ = Shenzhen, Guangdong province; DW = Dongguan, Guangdong province. All organization names are pseudonyms.

The interview schedule was first confirmed with each interviewee through WeChat or phone calls in 11 September 2023. Also, conducted phone or face-to-face interviews from 11–15 September 2023 to 10 October 2023 using a semi-structured interview guide. The interview questions focused on the interviewees and their companies' views and experiences on DMC changes during the DT process. Each interview lasted from 30 to 90 min. Researchers communicated and confirmed with the interviewees based on the interview notes and analysis results after each interview. The interviews were recorded and summarized in written form for accuracy and completed the combined sampling based on the saturation model theory when no further insights were found.

To ensure data reliability, we used grounded theory principles and the methodology of Gioia et al.[30]. **Figure 1** is developed based on three steps: first order, second order, and aggregated dimensions. Therefore, the analysis comprised three steps: First, we used the open coding procedure identified by Tawse and Tabesh[31] to identify changes in the DMC of top managers during the DT process, and how these changes affected organizational performance and strategic development. Second, refined understanding of DMC changes and developed a framework of related conceptual categories. Third, we condensed the second-order themes into aggregate dimensions based on the theoretical saturation principle of Glaser[32]. Finally, we revised our interview records based on the theoretical framework we developed.

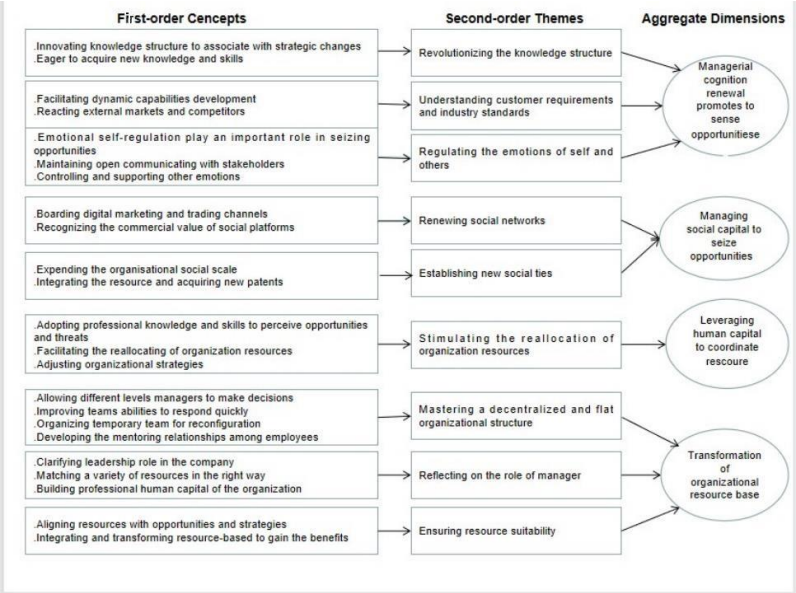
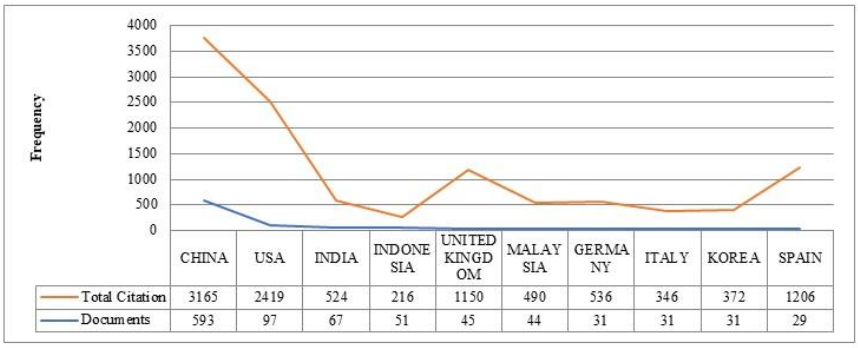


Figure 1. Data structure (Source: Gioia et al.,[30]).

4. Research finding

4.1. Publication trend

Figure 2 illustrates the increasing number of studies within the academic literature related to "cross-border e-commerce." This research initiative commenced in the year 2000 and reveals a consistent year-on-year growth in the number of publications. A total of 2271 papers have been published on this topic, collectively referenced a remarkable 10,424 times. **Figure 3** provides a visual representation of the annual production for the top 20 out of the 111 nations that contribute the most articles concerning international online trade. It's worth noting that publications on international e-commerce have emanated from 119 different countries, with 111 of them meeting the specified criteria. As depicted in **Figure 3**, China emerges as the leading contributor among developing nations with a total of 593 publications, garnering 3165 citations. Following China are the United States with 97 publications and 2419 citations, and India with 67 publications and 524 citations, as illustrated in **Figure 3**.



	CHINA	USA	INDIA	INDONESIA	UNITED KINGDOM	MALAYSIA	GERMANY	ITALY	KOREA	SPAIN
Total Citation	3165	2419	524	216	1150	490	536	346	372	1206
Documents	593	97	67	51	45	44	31	31	31	29

Figure 2. Publication trend based on country.

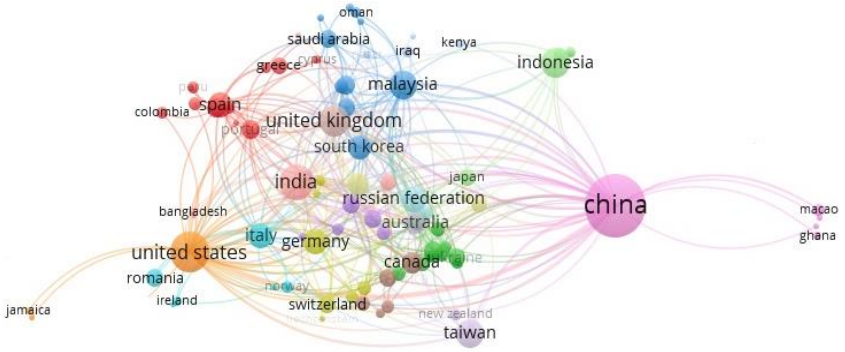


Figure 3. Cross-border e-commerce publications based on country.

Table 3 presents the top fifteen (15) journals that featured the highest number of publications related to cross-border e-commerce from 2000 to 2023. Notably, the journal Sustainability led the list with 60 publications and 795 citations, followed closely by the journal of retailing and consumer services, which boasted 53 publications and 608 citations. It's worth mentioning that the majority of these journals were indexed in Web of Science (SSCI, SCIE, and ESCI). The findings of this study underscore that the prevailing publications predominantly focused on the topics of digital transformation, dynamic managerial capabilities, organizational structure, innovation, and cross-border e-commerce.

Table 3. Number of publications based on journals.

No.	Journals	H_index	G_index	M_index	Documents	Total citations
1	Sustainability (Switzerland)	14	26	2.333	60	795
2	Journal of Retailing and Consumer Services	7	13	0.875	53	608
3	Information Systems Journal	4	4	0.364	43	571
4	Journal of Business Research	7	8	0.467	33	515
5	Technological Forecasting and Social Change	9	12	0.563	31	512
6	Information and Management	7	7	0.438	28	398
7	International Journal of Electronic Commerce	6	6	0.429	23	380
8	Electronic Commerce Research and Applications	8	14	0.571	23	340
9	Technology in Society	7	7	1.167	20	340
10	International Journal of Physical Distribution and Logistics Management	4	5	0.8	16	311
11	Journal of Global Information Management	5	5	0.313	14	283
12	Procedia Computer Science	5	11	0.556	14	202
13	Journal of Open Innovation: Technology, Market, and Complexity	7	11	1.75	13	125
14	International Journal of Business Information Systems	4	7	0.25	13	111
15	Computers And Industrial Engineering	4	4	0.444	12	100

Note: One common academic statistic is the H-index score, which takes into account both the total number of articles published and the total number of citations for each author. The top G articles with a total of G citations are shown in the G-index. A Journals M-index is equal to their H-index split by their total active years in the field.

As depicted in **Figure 4**, each item is characterized by a label and node. The size of both the label and node is determined by the item's weight, reflecting its level of importance. Additionally, the distances between various keywords, their positioning, and their interconnectedness with other topics illustrate their relationships within the bibliographic network map. The bibliometric analysis highlights several variables related to e-commerce, which are represented by prominent letters. This signifies research that investigates the effects or relationships of these variables with cross-border e-commerce. Ten (10) primary subjects closely associated with cross-border e-commerce have been identified, each with its respective frequency: innovation (312 occurrences), information management (116 occurrences), competition (110 occurrences), digital transformation (75 occurrences), internet (90 occurrences), big data (79 occurrences), marketing (78 occurrences), mobile commerce (57 occurrences), international trade (53 occurrences), and customer satisfaction (45 occurrences).

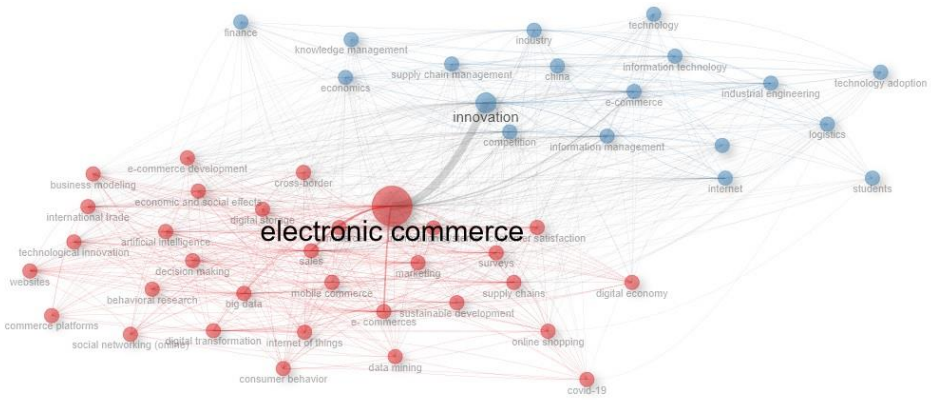


Figure 4. Trending keywords used from (2000–2022).

4.1.1. Explain of initial situation of DT in SMEs based on interviews

All interviewees had prior cross border e-commerce experience or had used IT for production and sales, indicating a certain level of familiarity with DT. They all participated in a professional training program for managers organized by Alibaba. For senior leaders with DT experience, the priority was to understand their strategic leadership role in the organization's DT development. SMEs make up the majority of these businesses, and their owners play a crucial role in sensing, learning, coordinating, and integrating assets and competencies to make decisions that will benefit their organizations. Our theoretical analysis focuses on developing the DMC of top managers in the DT process to identify opportunities and threats and transform the resource base of the SME to increase its performance and competitiveness in a challenging external environment.

4.1.2. Managerial cognition renewal to identify opportunities

Teece[33] argued that identifying opportunities includes an organization's perception of the potential opportunities and resources through activities such as scanning, creating, learning, and interpreting. Opportunity identification and entrepreneurship are closely related, as identified opportunities should consider not only customer and industry requirements but also the changes in the overall market, suppliers, and competitors.

4.1.3. Revolutionizing the knowledge structure

Idrees et al.[34] noted that managers' knowledge structures are linked to changing contexts, thus leading to differences in organizational strategies. Altintas et al.[35] emphasized that developing opportunities requires the improvement of dynamic capabilities, including the enhancement of senior managers' skills and awareness of the external environment. Entrepreneurs in the process of DT can update their cognition through the iteration and interaction of processes such as replacing their previous knowledge structures, adapting to changing customer demands and business models, and promoting innovation in learning capabilities.

Entrepreneurs often participate in training programs organized by third-party platforms or institutions to innovate their knowledge structures. Through the analysis of data and information provided by these platforms, they no longer blindly pursue the CBEC model of benchmarking companies, but instead expand their abilities to tap new sales channels and target customers. By mastering new policies and rules, entrepreneurs try to break through the classification barriers of customers and integrate resources to renew their knowledge structure by combining their original experience and knowledge to change the business model of their organization.

Our data analysis indicates that executives expect to innovate their knowledge structures when companies first start DT. Entrepreneurs with extensive traditional experience should have used digital technologies to improve their organizations' effectiveness, but this does not always work out as expected. Senior leaders gradually realize that their original knowledge framework could not help them identify opportunities more actively, resulting in a loss of capital and original markets. Conversely, start-up entrepreneurs without any experience in e-commerce or DT are concerned about losing the opportunity to interpret the external environment due to a lack of relevant knowledge structure. Therefore, both startups and entrepreneurs moving from legacy business models are aware that DT development constantly promotes business model innovation. To improve organizational performance and enhance competitiveness, they are eager to innovate their knowledge structures and refine their competencies to better identify development opportunities, such as:

At first, we did not think that the CBEC platform operation would be so difficult, and even simply believed

that if we recruited staff who were good at communicating in English to interact with foreign customers, we could increase sales. However, when we went to participate in the relevant training of the platform organizations, we gradually found that the original knowledge and experience could not increase organizational performance at all. We must understand the real concept of digitalization, and even understand how to obtain customers or their needs through data and conduct customized production. Because only in this way, we can seize the benefits and opportunities brought by the rapid development of IT to CBEC (AP).

The knowledge structure of senior managers plays a crucial role in predicting markets, perceiving opportunities, making decisions, and ultimately acting based on this knowledge structure, which can have a positive impact on sales[13]. Top managers renew their knowledge structures differently, with some companies emphasizing the need to constantly innovate this structure in terms of technical aspects, customer preferences, and policy trends. These managers actively participate in professional training courses to expand their social networks and learn from the experiences of other entrepreneurs, thus being able to enhance their ability to perceive opportunities and adapt to contextual changes, as per the quote below. Additionally, extant research has shown a real overlap between managerial cognition and social capital, which supports dynamic managerial capabilities.

Last year, I attended the annual meeting of SMEs organized by Alibaba. Because we are B-end producers, we are never paid attention to the needs of C-end users. When I listened to what the other managers were sharing, in fact, for small customers, multi-batch production does not necessarily increase production costs. If we can accurately locate their needs based on data information and technology, it is completely possible to develop new customers. Especially after the pandemic, the global economic situation has declined, and we are losing many original customers. We must consider entering the retail market. After all, our supply chain has more advantages than that of ordinary C-end producers. I am sure that by learning new knowledge, I can bring more diverse guidance and strategic advantages to the organization (AP).

4.1.4. Understanding of customer requirements and changes in the industry

Entrepreneurial activity and identified opportunities are closely related, according to Teece[33] and other scholars. However, this relationship extends beyond start-ups, to established companies, and entrepreneurial activity is not solely the responsibility of top managers, but of all employees. Strong dynamic capabilities in organizations are linked to a strong entrepreneurial spirit, which is in turn facilitated by digital technologies that aid SMEs in continually developing these capabilities and staying attuned to customer needs and technological advancements. This reflects the DT process, where big data analytics and AI support companies in perceiving changes and creating customer-focused products and services:

The competitive pressure in the children's clothing market is enormous. If you cannot keep an eye on your customers, you can easily lose them. In my business, I require sales staff to accurately grasp the needs of customers and even current fashion trends. Otherwise, when customers ask for customized products, sales are disadvantaged due to the need for on-site access to information leading to a reduced feedback speed. Because of the development of Internet technology, fast feedback has become the main ability of sales staff. In other words, our unfamiliarity with customer needs makes us lose an opportunity. Therefore, I think it is very necessary to prepare in advance to understand the needs of customers and even the current emerging technologies and trends, which will help us to perceive possible opportunities (CC).

Teece[33] and Han et al.[1] advocated that effective managers should have the ability to respond to

external markets and competitors. This involves comprehending and reacting to the actions of suppliers and competitors. As organizations increase their understanding of the developments of suppliers and competitors, they can better identify opportunities and resources to facilitate DMC. For SMEs undertaking DT, accurately controlling structural changes in the industry and the development routines of competitors are essential to identify opportunities, a process known as "opportunity identification." This highlights the positive impact of dynamic management and entrepreneurial activities on the organization:

> *As a business owner, a daily task I must do is to browse all the online stores of our organization's biggest competitors. In addition to finding out if other companies are designing new products, I must pay attention to the changes in the offers of products similar to ours. At the same time, since the platform often organizes promotions, I also need to know if the competitors are participating in the event, which has a huge impact on our business and results in changes in the market share occupied by the organization. Because of this, I could analyze the market demand and industry changes more effectively (PS).*

4.1.5. Regulating the emotions of self and others

Scholars argued that, depending on the emotional regulation of oneself and others, the resources of the organization can be mobilized. On the one hand, entrepreneurs who are highly focused on the emotional regulation of the self (ERS) can motivate themselves to gain psychological benefits, leading to proactively participating in managerial human capital to mobilize resources and seize opportunities. On the other hand, a high level of attention to the emotional regulation of others (ERO) can motivate the organization's stakeholders to make rational judgments and mobilize the managerial social capital of the company. These psychological activities positively influence the entire organization, which is appropriate for changing contexts.

In this sense, the emotional shift of entrepreneurs is evident. In the early stages of a business, they passively accept DT and join the CBEC industry to sustain their operations before digital development[7]. With the use of DT, enterprises obtain rich benefits and entrepreneurs realize the competitive advantages and agility that digital development brings to business operations and management. DT accelerates an organization's agility and rapid response capabilities, and this change also accelerates the change in managers' mental state, which is an important element affecting dynamic managerial capability. For example, most entrepreneurs switch from passive acceptance to a proactive attitude to achieve DT and actively identify opportunities for digital development. This emotional shift is effective and has a positive impact on DMC:

> *In the beginning, we only planned to invest in platform operating expenses, with a total price of 39,800 yuan/year ($5700/year). However, with the development of technology, we had discovered a wider market. To better obtain information resources, we must invest a lot of money for data acquisition and analysis and even invest a high cost of platform maintenance and publicity. Now our company's products account for nearly 70% of the market share and we will continue to expand through other digital channels in the future. I absolutely believe that our company can become a benchmark in this field in the future (PT).*

The concept of ERS, which involves emotional self-regulation related to time and rewards, is significant for DMC. This is also supported by our research findings. For example, despite the ongoing decline in the global economic situation, entrepreneurs mentioned that their company size, performance, and strategic development had improved. They evaluated the process as a constant rise and fall and emphasized the need to focus on long-term development rather than on short-term tasks. They also emotionally engaged their egos

to maintain their enthusiasm for DT, which shows the importance of ERS in dealing rationally with events and focusing attention on digital development. Positive emotions help managers deal with events rationally and maintain their attention to digital development. Therefore, ERS has a significant impact on the mobilization of corporate resources to seize opportunities. Furthermore, reward-related ERS, which includes mental activities such as interest, enthusiasm, and courage, plays an important role in seizing opportunities:*I used to work at Tencent, and my experience in a big company made it easy for me to get many opportunities, but since my interest is chip production, not coding, then I resolutely quit the job. In the beginning, I was responsible for both production and sales by myself, and I worked more than 14 h a day. I never thought of giving up because I think interest is the best teacher. Even though I was very busy at work, I still went to acquire some management knowledge, which was very beneficial. They made me think and solve problems more professionally, and I even found it helpful to innovate product processes. I was very fortunate to be able to work in the industry I love and have achieved successfully. Then I gained financial income and self-satisfaction (CP).*

The use of reward-oriented ERS can positively affect the emotions of managers and entrepreneurs, thereby inhibiting negative emotions and fostering positive ones such as satisfaction, interest, and enthusiasm. These positive emotions can regulate physical exhaustion and reduce the generation of negative emotions, which can, in turn, stimulate creativity and innovation to seize opportunities. For instance, the founder of a chip company reported feeling satisfied with both the financial and psychological rewards of chip production[36]. Despite working long hours, he did not feel fatigued due to the positive emotions he experienced. Therefore, reward-oriented ERS can help managers regulate their emotions and foster resource mobilization to seize opportunities. This is particularly important for SMEs with limited resources and, hence, need to focus on mobilizing existing resources. Therefore, top managers should pay attention to ERO by maintaining open communication, controlling emotions, and supporting stakeholders, as it can help to prevent mismanagement and improve corporate resource mobilization, transformation, and performance growth in the DT process:

As a boss, I am always aware of the changing moods of my employees and managers. Because they work under great competitive pressure, many times I must "put out the fire" for everyone. Although it is good to have competition within the company, the CEO should not let the internal members lose cooperation and trust because of competition. Therefore, whenever they are in a mood, I will communicate with them openly to understand their needs and regulate the relationship within the organization. Especially when it comes to sensitive topics such as promotion and salary increases, I deal with them through conversation. It can be said responsibly that I think employees' emotions are very important, and only when one is happy in the company, can they bring more benefits to the company (PS).

4.2. Managing social capital to seize opportunities

The DMC is the ability of managers to create, integrate, and reconfigure organizational resources. This capability is underpinned by managerial cognition, social capital, and human capital. According to Adner and Helfat[37], social capital refers to the formal and informal relationships that provide managers with information channels, enabling them to perceive and seize opportunities. Organizations use external social capital to acquire financial and human inputs, while internal social capital can aid the rational allocation of assets and contribute to the internal structure of the organization[36]. Managers' social capital facilitates the acquisitions of the firm and the optimization of resource combinations. Teece[33] emphasized that entrepreneurs must focus on business processes and cost structures to be aware of customer needs and market changes, thus enabling them to minimize personal biases and barriers to decision-making and create more value for the organization. In this era of information technology development, top managers tend to use

social networks to access information.

4.2.1. Renewing social networks

Social media and social networks have a significant impact on the analysis of market and customer needs and the selection of technology for production, which are essential DMC aspects. Scholars have extensively studied the relationship between social network development and DMC and existing research highlights that managers utilize social networks to identify opportunities and make strategic decisions[13]. This study's findings are consistent with previous research, which underscored the importance of social networks for managers. Our interviews revealed that all participants had started developing new social networks, with SMEs using e-commerce trading platforms such as Alibaba and Amazon to enter the social network. Entrepreneurs are recognizing the commercial value of social platforms and are gradually building new social networks to communicate and increase the benefits to their businesses. These networks establish both formal and informal relationships between executives and organizations, providing conduits for information that can assist in identifying new opportunities. For instance, the CEO of a children's clothing company registered accounts on TikTok and LinkedIn and posted frequently to attract attention and consultation. Furthermore, business owners are agile and quick to redeploy resources when they perceive new opportunities. Therefore, many organizations are inclining resources towards social e-commerce and expanding their brands through social communication, leading to win–win situations with competitors in the same industry.

4.2.2. Establishing new social ties

Previous research has indicated that both established multinational firms and small start-ups can benefit from the external network of relationships that top managers have[38]. For example, at McDonald's, the CEO actively used external information to promote internal organizational change, making the firm more responsive to strategic changes brought about by different contexts and competitive pressures. In the software industry, entrepreneurs were found to use individual social relationships to better integrate their organizations into the local industry environment and quickly surpass the start-up phase. Similarly, Acquaah[39] found that founders who integrated social capital in emerging industries, such as managers of other firms, government officials, and local community leaders, had increased productivity and sales revenue. These findings highlight the advantages of social ties for making strategic changes and promoting company performance growth, which is consistent with our own data:

> *Now, thanks to the rich and diverse access to information, as decision-makers in companies, we need to identify the information, explore the opportunities that can increase the company's revenue, and then seize them. Last year, there was an order that caused the buyer to default on the contract due to shipping problems. The whole 5000 hats were still in transit, but there was no buyer when the goods arrived. At that time, I felt very bad because we are a small company with weak liquidity, and this default could have resulted in a loss of 100,000 U.S. dollars. Later, the trade department manager mobilized all the channels to help me, they found a new buyer, but the results were not satisfactory. (HC).*

Based on the above case, the SME expanded the social scope of the organization, speeded the organization's access to information, and improved its rapid response capability. Additionally, the collection of individual social connections of senior executives brings new social ties to the organization and the information thus obtained is significantly relevant for the organization to prioritize DT activities in a constantly changing environment, such as using new technologies to increase productivity and expand sales channels:

In addition to expanding sales channels through popular social media platforms and e-commerce sites, I believe that investing in digital technology to increase productivity remains the most important step in the DT of traditional industries. Our company has four patented technologies that improve our productivity and reduce production costs. Because of our limited corporate resources, we cannot develop them alone. Government staff helps us contact some students, set up production incubators or research institutions to reach agreements with us so that we can use preferential prices to obtain new technologies and increase productivity (VC).

Senior managers of this company integrated the resources needed by the organization through their personal social connections, thus acquiring new patents and achieving increased organizational performance due to changes in productivity. The innovation of social networks and the development of social chains effectively support the development of managers' dynamic management capabilities, thus driving the organization to be more effective, even in a changing environment.

4.3. Leveraging human capital to coordinate resources

Becker introduced the concept of human capital in 1964 as skills and knowledge acquired through experience, education, and training; scholars have since extensively studied this concept. For instance, Ployhart and Moliterno[40] argue that human capital should include cognitive abilities and other competencies, being referred to as KSAO. Helfat and Martin[41] similarly analyzed the cognitive and emotion regulation of managers. However, in this study, the term "human capital" is used to refer to the core characteristics of knowledge, education, experience, and skills.

According to Cohen and Levinthal[42], managers' absorptive capacities for information and technologies vary based on their educational backgrounds, skills, and specific industry knowledge. This affects their ability to implement DMC acquisition. The empirical study by Cao et al.[43] supported the positive impact of managers' education and work experience on organizational strategy change and performance improvement. The interviewed CEOs agreed that their educational and work experience were crucial for organizational success.

Moreover, Helfat and Martin[41] stated that managerial human capital includes both generic and specific knowledge and skills, which contribute to organizational performance. In the DT process, managers' human capital works with two other factors to improve performance by perceiving opportunities and threats, reallocating resources, adjusting structures, and shifting strategies. However, the receptivity to information and knowledge varies among managers, thus affecting their perceived management and social capital. For example, despite attending training sessions, the CEO of CC lacked the knowledge and skills to improve organizational performance. Given the demanding children's clothing industry, CC invests in producing environmentally friendly and high-quality products through new technologies. In short, top managers require specialized skills, experience, and updated theoretical knowledge of environmental protection. Martin[23] argued that when examining managerial human capital, it is important to consider the human capital of the entire team and how members complement each other. The aggregation and complementarity of human capital among team members can positively impact the team's performance and, potentially, the organization. In addition to the human capital of the team, external resources can also contribute to innovation teams, where members come from various departments within the organization or from external agencies, and their diverse knowledge and expertise can create a more comprehensive R&D, production, and sales team:

We do not exclude companies from cooperating with each other to produce a win-win or even multi-win situation. Our company is mainly engaged in the production of yoga clothing and is not specialized in other related products. If we rigidly invest in the production of other products, it may cause risks such

as waste of resources and lower customer satisfaction. However, the needs of customers are becoming more and more diversified, and the combined sales model of blind boxes is gradually becoming popular in the market, so I must seize such opportunities to improve our sales capacity. Even if our company does not have the absolute strength to produce blind boxes, we can invite other professional manufacturers or individual studios, then win-win results will be achieved (YC).

4.4. Transformation of the organizational resource base

Transforming the resource base of a company is essential for improving organizational performance and profitability. Top management must ensure that all organizational resources are effectively utilized to achieve the highest level of performance and profitability, as noted by scholars such as Sirmon and Hitt[44] and Eggers[45].

4.4.1. Mastering a decentralized and flat organizational structure

Entrepreneurs often adopt decentralized and flat structures to facilitate decision-making and distribute authority within the organization. As such, SMEs need to balance resource deployment and innovate their resource base through dynamic capabilities development. Many entrepreneurs reconfigure their organizational structures to meet the demands of a dynamic market, resulting in frequent and temporary changes. Such changes are appreciated by employees, as they help integrate resources, optimize the structure, and promote innovation. The decentralized and flat structure also mobilizes employees' motivation and dedication, leading to improved company performance:

For us, constant changes in organizational structure are a rare occurrence. Sometimes we need to produce products according to customers' custom requirements, so we must gather the best employee from the whole company to form new R&D, production, and sales teams, which requires us to change the original organizational structure and create new collegial relationships. Moreover, our employees are willing to try this change, and the loose organizational structure gives them the opportunity to work with employees from different departments and improve communication between employees (AP).

Entrepreneurs prioritize mentoring relationships within their organizations and delegate the responsibility of employee recruitment to team leaders. The flat and agile structure of CBEC enterprises facilitates mentoring relationships, where team leaders are more willing to provide guidance to new employees they have selected. The close relationship between mentors and mentees improves team cooperation and agility, which positively affects firm performance.

4.4.2. Reflecting on the role of manager

Entrepreneurs reflected on their roles as top managers after being inspired by their achievements. They realized that, as their businesses grew, their leadership role in the organization needed to focus more on maintaining effectiveness and developing strategic direction rather than just survival[26]. Altintas et al.[35] emphasized the importance of CEOs focusing on future strategies instead of the present production or operational activities. We also found that some high-level managers reallocated corporate resources to invest in technology production and develop new products and services due to the high acceptance of digital transformation. This resulted in a shift of capital within the organization and optimization of the executive management and sales teams:

Our company organizes team activities every month, hoping to strengthen the relationship between employees or between teams. I am very concerned about the mental state of the employees and communicate with them often and only their team leaders focus on employee performance. Every afternoon, our company has a special teatime, where everything is paid for by the company. I just hope

that employees can work comfortably, because only when they feel happy can they create more benefits for the company (PS).

4.4.3. Ensuring resource suitability

According to Teece[33], top managers must ensure that the resources of the organization match their development strategies, meaning that all resources should be complementary. It is thus important for top managers to apply the strategic vision of the organization during technological or business model changes to ensure successful implementation. Additionally, the adaptability of coordinating resources within an organization is crucial for SMEs to fully integrate and transform resources to gain business benefits. The respondents emphasized the importance of matching the process of digital transformation with the company's mission and strategic goals. They cited challenges such as high saturation in the market, difficulty in improving efficiency, increasing domestic labor and raw material costs, and a shrinking global market, which drove them to redefine their organizational base[9]. Managers' DMC has a positive effect on implementing strategic change and performance improvement, particularly in restructuring assets, new product development, and new market development.

5. Discussions

In the current IT and AI landscape, SME entrepreneurs must drive digital transformation and rely on DMC to improve organizational performance. The DT process affects the business model, strategic perspective, and new market development. The scarcity and spontaneity of resources for SMEs force entrepreneurs to deepen their management capacity building, leading to a reshaping of the top management's role. Recent studies focused on SMEs' DT process and emphasized the importance of top managers' competencies in coping with DT development[3]. We found that DMC positively affects organizational development and top managers' competencies shift in response to changes in the external environment, contributing to shifting business models and reforming the strategic direction of the organization for sustained profitability.

By integrating these findings and comparing them with the literature, we present in **Figure 5** a process model of how SMEs entrepreneurs can leverage the creation and development of managers' dynamic management capabilities to drive organizational digital transformation. As the model shows, a successful digital transformation initiated by an SME entrepreneur requires entrepreneurs to do much more than embrace technology.

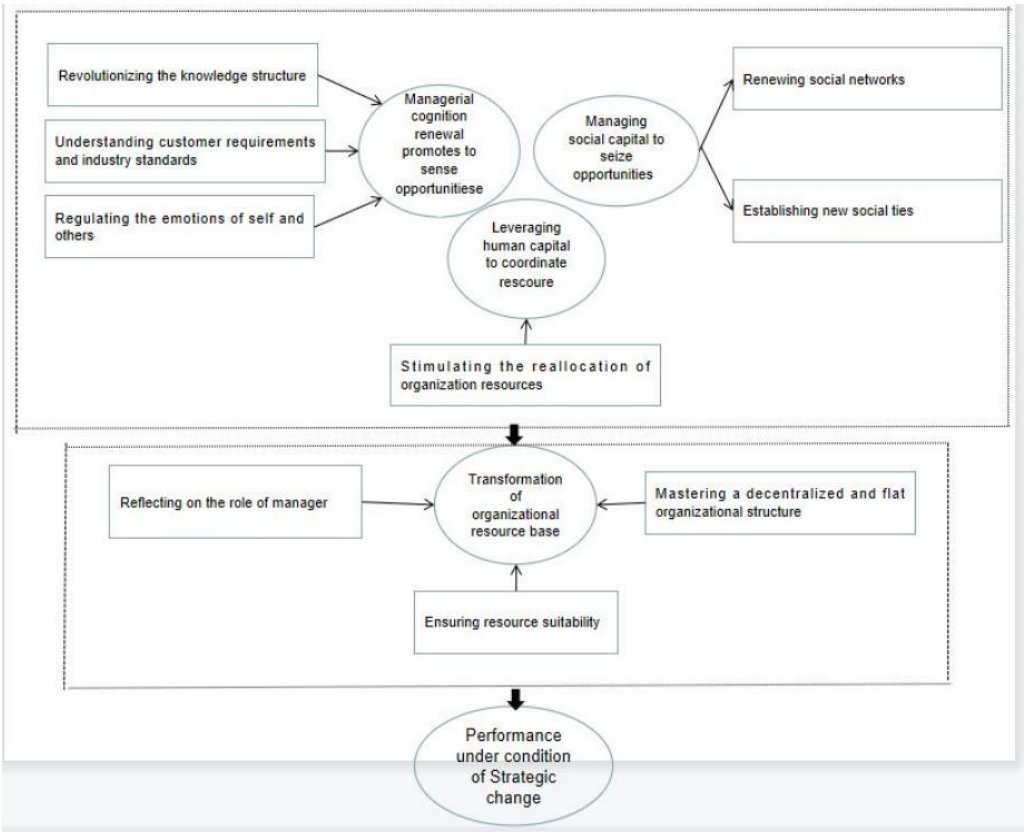


Figure 5. Process model of digital transformation by SME managers.
Note: in this model, the second-order themes identified in **Figure 5** are represented in the solid boxes. The aggregate dimensions are represented in the dashed boxes.

5.1. Digital transformation and dynamic managerial capabilities

Previous research has provided guidance on DMC[21]. Scholars suggested that managing perception, social capital, and human capital are the ancestors of DMC and are intertwined and iterative[20]. SME entrepreneurs play a crucial role in DT and improving management perception promotes managers to identify opportunities and threats. Social and human capitals have a significant impact on carrying out the DT process, with human capital being the most significant factor in our data collection. Further, social and human capital interact with each other, leading to a deepening of the ability of senior managers to react and decide quickly, which accelerates organizational brand communication and enhances the experience of interaction with internal and external communication. SMEs can take ownership of human capital, enrich their management teams, and even develop new models of collaboration and shift organizational structures and strategic directions.

Scholars argued that the three managerial ancestors promote strategic change and revitalize an organization's dominant logic. They also drive managers to perceive opportunities, seize them, and transform the organization's resource base. We found that technology has brought about decentralization and flattening of organizational structures, enhancing responsiveness and promoting competition and cooperation among teams. Managers use social platforms to communicate with outside experts and find collaborators, enhancing human capital and competitiveness. SME entrepreneurs must thus consider the adaptability and fit of resources to optimize organizational strategy and transformational power. Additionally, our study showed the role of psychological support in dynamic management capabilities, but further exploration is needed.

5.2. Practical implications

Current research also provides a new perspective for senior managers in the digital transformation process, helping them identify opportunities and threats, establish and enhance dynamic management capabilities, and sustain organizational performance. We propose a dynamic management capability process model that encompasses managing cognition, managing social, and managing human capital and can help form iterative and entwined relationships. This study thus provides process models for senior managers to learn from their peers, develop their own managerial competencies, and understand key actions to take. Our research is particularly relevant to senior managers in SMEs but also has implications for managers in the public sector and large enterprises. Our model is a tool for the dynamic capacity building of managers to support them in creating and developing managerial competencies and driving organizational performance. We hope that our study will prompt managers to continually reflect on their own strategic rationale and provide them with management tools.

6. Limitations and further research directions

The current study has several limitations worth noting. First, the relatively small sample size and sampling strategy suggest that the findings cannot be generalized to all SMEs engaged in DT. Second, this study is based on interview results and perceptions of respondents, who may despise objective results relative to the objectivity of statistical surveys although we clarified the scope of the study by continuously discussing with the interviewees in the pre-survey period for result objectivity. However, the resulting results still need to be validated by other researchers. Finally, we hope that this study will add to the literature and provide a basis for further research by other scholars. In the future, due to the complexity and diversity of DT, research on organizational transformation may involve talent practice management, continuous learning, and other aspects. The list of issues listed below may create a direction for future research:

(1) In the DT process, how can entrepreneurs continuously innovate their knowledge and skills to ensure that their management capabilities meet the needs of business transformation?
(2) How can managers more effectively implement dynamic management capabilities to better develop the organization's DT process?
(3) How strongly does DMC correlate with individual psychological perception? How can this relationship be leveraged for organizations, especially SMEs, to enhance strategic transformation and performance?

We believe that our research also needs to be supplemented in the following areas. For example, the insights of SME business owners about DT and the attitudes toward developing DMC in different cultural contexts, the relationship between psychological functioning and individual dynamic capabilities based on the studies, or the implications for strategic organizational transformation are notable areas for discussion. In addition, we believe that quantitative research on related topics could complement our qualitative findings.

Author contributions

Conceptualization, GY and ZDM; methodology, GY; software, GY; validation, ZDM, HBG and ZY; formal analysis, GY; investigation, GY; resources, GY; data curation, GY; writing—original draft preparation, GY, ZDM, HBG and ZY; writing—review and editing, GY, ZDM, HBG and ZY; visualization, ZDM, HBG and ZY; supervision, ZDM, HBG and ZY; project administration, ZDM, HBG and ZY; funding acquisition, GY, ZDM, HBG and ZY. All authors have read and agreed to the published version of the manuscript.

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Conflict of interest

The authors declare no conflict of interest.

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