How do textile enterprises use digital technology to realize green innovation? A multicase comparative study

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ABSTRACT – REZUMAT

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The application of digital technology in textile enterprises can promote their search for knowledge, and its crucial meaning lies in injecting new evolutionary power into the green innovation of enterprises. This research delves into strategies for fostering knowledge search in enhancing textile enterprises' digital technology capabilities, ultimately refining and establishing a framework that catalyses green innovation. Employing the grounded theory approach, this research outlines the dimensions and critical attributes of digital technology, knowledge search, and green innovation practices in textile enterprises. Furthermore, this research constructs a theoretical frame enabling textile enterprises to harness digital technology for knowledge exploration and advancing green innovation. The findings reveal that textile enterprises use digital technology to help multiagent interaction, forming the dynamic support of green incremental and radical innovation. Knowledge search is critical for textile enterprises to realize green innovation using digital technology. Therefore, this study unveils a new path of development for nd green innovation in textile enterprises under the backdrop of the construction of ecological civilization.

Keywords: *textile enterprises, digital technology, knowledge search, green innovation*

Cum utilizează întreprinderile textile tehnologia digitală pentru a realiza inovarea ecologică? Un studiu comparativ multicaz

Aplicarea tehnologiei digitale în întreprinderile textile poate promova căutarea de cunoștințe, iar semnificația sa esențială constă în injectarea unei noi puteri evolutive în inovarea ecologică a întreprinderilor. Această cercetare analizează strategiile de încurajare a căutării de cunoștințe în cadrul consolidării capacităților tehnologice digitale ale întreprinderilor textile, rafinând și stabilind în cele din urmă un cadru care catalizează inovarea ecologică. Utilizând abordarea teoriei fundamentate, această cercetare subliniază dimensiunile și atributele critice ale tehnologiei digitale, căutarea de cunoștințe și practicile de inovare ecologică în întreprinderile textile. În plus, această cercetare construiește un cadru teoretic care permite întreprinderilor textile să utilizeze tehnologia digitală pentru explorarea cunoștințelor și avansarea inovării ecologice. Rezultatele arată că întreprinderile textile utilizează tehnologia digitală pentru a contribui la interacțiunea multiagent, formând suportul dinamic al inovării ecologice incrementale și radicale. Căutarea cunoștințelor este esențială pentru ca întreprinderile textile să realizeze inovarea ecologică utilizând tehnologia digitală. Prin urmare, acest studiu dezvăluie o nouă cale de dezvoltare pentru inovarea ecologică în întreprinderile textile, care este de mare importanță pentru tehnologia digitală, producția inteligentă și inovarea ecologică în contextul construirii civilizației ecologice.

Cuvinte-cheie*: întreprinderi textile, tehnologie digital, căutare de cunoștințe, inovare ecologică*

INTRODUCTION

Data has emerged as a fundamental strategic asset with advances in digital technology and data analytics. The embedded and integrated nature of digital technology has opened new horizons for the search for knowledge and green innovation in textile enterprises [1]. The strategic emphasis on promoting digital technology in textile enterprises is crucial to integrating the digital economy with the real economy [2]. From a resource-based perspective, digital technology enables enterprises to integrate and collaborate with knowledge, reducing the costs associated with information inquiry, production, transportation, tracking, and verification. This is achieved through integrating digital resources [3, 4]. Knowledge search theory suggests that knowledge search serves as the primary medium for knowledge circulation, improving the competitiveness of textile enterprises in a dynamic external environment and effectively promoting green innovation [5, 6].

In the context of green innovation, digital platforms, and information technology facilitate the dissemination and integration of knowledge, increasing the flow of knowledge search and promoting green innovation [7, 8]. According to knowledge search theory, knowledge search is the primary medium of knowledge circulation. Therefore, knowledge search can improve the competitiveness of textile enterprises in an external dynamic environment, thus effectively promoting green innovation of textile enterprises [6]. In green innovation, digital platforms and information technology

are used to increase the flow of knowledge search, thus promoting green innovation [8]. In the context of green innovation and evolution, there are certain particularities. For the local situation, under the influence of digital technology and knowledge search, the evolution of green innovation performance should be analysed in depth with specific cases. Regarding research methodologies, the prevailing trend leans towards single-case studies, with a notable absence of multicase studies, which could offer a more comprehensive and nuanced understanding.

Can the application of digital technology form a new way to influence the green innovation of textile enterprises based on knowledge search? Drawing from a range of theories encompassing technological innovation, digital empowerment, the resource-based view, and dynamic capabilities, this research reviews pertinent literature on digital technology, knowledge search, and green innovation. Focusing on the widespread adoption and penetration of digital technology in textile enterprises, it contributes to broadening the theoretical landscape of green innovation within the textile industry. This research examines four Chinese textile enterprises across subsectors to explore how digital technology drives green innovation in the knowledge-information era. Analysis of digital technology applications, knowledge search, and green innovation cases reveals strengths in digital construction, production planning, intelligence boosting, and scene utilization. Additionally, fundamental practices and knowledge acquisition routes for green innovation with digital technology are examined. Focusing on both practical demands and theoretical shortcomings, the mechanisms supporting green innovation in textile enterprises, enabled by digital technology, undergo refinement. This refinement strives to elevate and strengthen their green innovation performance amidst the digital era.

The marginal contributions of this research are as follows:

- First, based on the perspective of knowledge search and modern organization theory, the case study objects are comprehensively described and systematically deconstructed, and the process and influence mechanism of digital technology that empowers green innovation of textile enterprises are analysed.
- Second, employing grounded theory's coding technique, multicase studies were conducted across four textile enterprises. This research deepened the understanding of digital technology theory and examined the mechanisms by which digital technology fosters green innovation in textile enterprises. This endeavour enriches and broadens theoretical research on digitalization and organizational dynamics, offering valuable insights to guide green innovation practices in the textile industry.
- Third, it formulates effective control policies and provides policy suggestions and implementation paths for the government to transform the business model of textile enterprises, digital intelligence, and green development.

LITERATURE REVIEW

Green innovation is a collective behaviour that impacts the entire life cycle of enterprises, including reducing unit energy consumption, developing clean energy, recycling waste, and designing green products [9]. Research interprets the meaning of green innovation from many perspectives, including enterprise value [10, 11], strategic decisions [12, 13], resource access [14], internal and external learning [7], and R&D capacity [15]. In addition, scholars also believe that green innovation can coordinate enterprises' economic and ecological effects, emphasize the orientation of the green market, meet the green needs of stakeholders, and be more conducive to winning green competitive advantages and sustainable development of enterprises [16, 17].

Green innovation research combines evolution, quantification, influencing factors, and performance [18]. Scholars define green innovation based on process and results [19, 20], measuring it through market share, benefits, energy conservation, pollution prevention, waste recycling, non-toxic design, and green products [21, 22]. The quantity and quality of green patents are key indicators. Efficiency measures use Super-SBM, GML, DEA, and SFA models [23, 24]. Green innovation is also classified as breakthrough and incremental [25, 27]. Driving factors for green innovation include political, market, stakeholder, technical, and other factors. Market factors reflect consumer demand for green products [28]. The pressure on stakeholders extends to the green innovation process [29]. Technical factors encompass green patents, professionals, and inter-organizational learning [30]. Realization paths range from value chains to asymmetric innovation [31–33]. Green innovation results measure economic, social, and environmental performance, competitive advantage, and organizational performance [34–36].

Digital platforms help improve enterprises' innovation management ability and teams' core competitiveness [37]. In the context of carbon neutrality, textile enterprises strengthen the tracking of digital technology innovation trends, actively organize green and advanced technology reserves, and improve the decision making of green development and R&D investment [38]. Non-competitiveness makes the same set of data infinitely copied to multiple agents for simultaneous use, overcomes the total limitation of traditional production factors, exerts the multiplier effect of the elements of the data, and fully releases the value of digital technology [39]. The boundaries between industries and departments tend to blur and the level of innovation of the corporate output improves. This is conducive to textile enterprises that use digital technologies and platforms to form information exchange and team cohesion [40, 41].

Knowledge search is a collective learning behaviour that crosses organizational boundaries and emerges based on members' shared values and communication modes when organizations explore knowledge,

such as market and technology, to acquire heterogeneous knowledge and improve technology, creativity, and cohesion [42]. Knowledge search is a process that goes from initial knowledge mastery to knowledge accumulation and innovative application [43]. Based on innovation search theory and knowledge supermodel theory, the communication between big data and information makes the organization gradually change into indoctrination-acceptance learning to supplement inertia, which reserves sufficient knowledge materials and data for green innovation and forms original incentives. How can research organizations communicate research knowledge to decision makers more effectively? Searches across knowledge boundaries significantly impact corporate innovation performance, and exploratory searches try to eliminate organizational conventions and knowledge bases and expand the width and depth of search [5]. Research on the use of knowledge in Canadian social science research found that knowledge is essential for enterprises to obtain a sustainable competitive advantage [44, 45]. Based on search theory and organizational learning theory, knowledge research affects the capability of enterprises to differentiate themselves through technology knowledge acquisition and dissemination [45]. From the perspective of dynamic capabilities, the resources obtained from the search for knowledge can be transformed into capabilities to promote the behaviour and performance of green innovation [46]. Knowledge search is essential for enterprises to overcome the double constraints of resource and technology shortages. However, its internal mechanism has yet to be explored and analysed [47, 48].

Existing research has made rich achievements, focusing on the connotation of knowledge search, digital technology, and green innovation, and it rarely studies the internal mechanism of green innovation in textile enterprises. Textile enterprises focus on the production, processing, and sales of textiles. It is a traditional industry with a long history and a broad market demand. Compared to other industries, textile enterprises pay more attention to selecting raw materials, improving the production process, and the quality control of products. The textile industry dramatically impacts the environment in the production process, including water consumption, wastewater discharge, and chemical use. The industrial chain of textile enterprises is relatively long, covering many links from raw material procurement, spinning, weaving, printing, dyeing, garment production, and sales. This long industrial chain requires textile companies to coordinate multiple links in green innovation to achieve overall greening. Therefore, textile enterprises face more significant challenges and opportunities in green innovation and need to reduce environmental impact and achieve sustainable development through technological innovation. At the same time, the textile industry is greatly affected by market changes. Consumer demand, fashion trends, policy environment, and other factors may impact the production and sales of textile enterprises. Therefore, textile enterprises must have a keen understanding of the market and the ability to respond quickly to market changes. The path of green innovation in textile enterprises has not been revealed, and there is a particular theoretical “gap”, which is the key to realizing textile enterprises from “survival” to “strength”. Therefore, based on grounded theory and through multicase analysis, this research discusses how textile enterprises use digital technology to realize prospective research and reactive search from the perspective of knowledge search to realize green incremental innovation and radical innovation of textile enterprises.

RESEARCH METHODOLOGY

A multi-case study is employed to delve into the impact of knowledge search on green innovation within textile enterprises, offering a comprehensive and nuanced understanding of the subject matter. The multi-case study is more suitable for expounding the particularity of actual activities and behaviours of internal organization and management, highlighting the organizational situation and green innovation process, and revealing the relationship between digital technology empowerment and green innovation. Selecting representative enterprises as case study objects, sorting out various enterprise data and interview data through information acquisition, and adopting data reduction displays to obtain structured and coded case data. At the same time, the characteristics and performance of case enterprises in each research variable are clarified. Through the analysis and comparison between cases, the universal laws of different enterprises in the relationship between research variables and the crisis development stage are found, the matching relationship is refined, and the mediating role of knowledge search is summarized.

Case selection

The criteria for selecting textile enterprises for research are multi-faceted, prioritizing those operational for over three years, successfully navigating initial risks, and embarking on a phase of green innovation. The availability of case data enhances the validity of the study. The empowerment of digital technology drives green innovation in these enterprises through “digital technology and digital platform”, optimizing organizational structure and strategy. Accurate identification of enterprise needs helps to focus green innovation efforts. Enterprises dynamically adjust their development and strategic goals to discover their unique green innovation paths. Selected enterprises must represent the future trends of China’s textile industry. Four enterprises in Hangzhou’s Linping, Suzhou’s Wujiang, Shaoxing’s Keqiao, and Nantong’s Tongzhou districts were chosen, with Hangzhou’s Linping District pioneering a “counting wisdom and Linping” journey, textile fabrics being a key industry there.

This study targeted four distinct textile enterprises located in Linping (Hangzhou), Wujiang (Suzhou), Keqiao (Shaoxing), and Tongzhou (Nantong) districts, chosen for their variation in digital technology adoption, size, personnel composition, capital base, business operations, and strategic goals. This heterogeneity allowed for a nuanced exploration of the impact of knowledge search on green innovation within the textile industry. This diversity enables a comprehensive, objective examination of digital technology, knowledge search, and green innovation. Furthermore, these enterprises boast strong governance, green innovation achievements, and high recognition. The study analysed their public data and reports to gain insights. The selected cases, renowned textile enterprises, exhibit strong typicality, guiding China and global textile development. Their digital technology is advanced, green innovation achievements are significant, and industrial development logic is precise. The selected textile enterprises should have a certain representativeness and can reflect common phenomena and trends in the industry. This helps to extend the research results to a broader range of textile enterprises and provide a reference for green innovation in the entire industry. Priority should be given to companies that have already practiced or achieved specific results in green innovation to further study the path, mechanism, and effect of green innovation. These companies can provide rich case and data support for research.

The enterprises in Wujiang District, Suzhou, focus on the R&D of core component technology, which ensures seamless data integration, long-term intelligent management, and garment production transformation, leading the domestic textile industry. The enterprises showcase strong prospects and research value. They implement strategic layouts, integrating digital technology and green innovation, which is essential for this study. The enterprises have actively pursued digital technology, knowledge search, and green innovation, facilitating data collection. Their clear digital strategies, knowledge search patterns, and green innovation layouts offer rich case study material. We visited Tongzhou District textile enterprises, and their digital and green achievements provided valuable data to explore the evolution of textile firms in these areas.

Linping has more than 7,600 clothing enterprises, and 80% of Hangzhou women's clothing is produced in Linping. Shengze Town, Wujiang District, Suzhou City, is called "Ancient Silk Town" and "Famous Textile City". It is a crucial textile base, export base, and trading center in China, where information release and textile index are produced and is committed to building a "fashion capital". The unique advantage of the "printing and dyeing + market" in Shaoxing Ke Qiao has led to the vigorous development of the textile industry in the Keqiao District and accelerated the transformation and upgrading of the traditional textile industry. Nantong is known as the "Textile City". The textile industry is Nantong's most recognizable and symbolic pillar, enriching the people industry. Nantong Tongzhou Bay makes every effort to build a green and low carbon textile park, and garment enterprises gradually transform to focus on high-end knitted fabrics and forward-looking technologies to achieve green development.

Based on the endowment factor and the development stage of the enterprises, the effective mode, typical path, and coping strategy of digital technology that empowers textile companies to green innovation are refined, and its development effect is analysed to further use digital technology to achieve green innovation breakthrough. This study selects four textile enterprises as samples to collect and analyze public data and company reports.

Data collection

First, access to official websites and media reports can help form a comprehensive understanding of textile enterprises and their development trajectories, news events, operating results, digital transformation initiatives, and other related information.

Subsequently, data on corporate characteristics, digital technology utilization, green innovation practices, and emerging trends were collected and collated from various sources, including but not limited to the company's official website, news articles, academic publications, industry analysis reports, and publicly available materials, such as annual or quarterly reports, corporate social responsibility reports, and interim financial statements.

Second, collect public documents, including authoritative media's news reports on enterprises. Search for keywords such as digital technology, green innovation, and knowledge search in paper databases such as Cnki.net, Weipu, and WOS, and collect relevant literature. Information from the official website information of the enterprise, "China Enterprise Innovation and Development Report". Collect relevant public news reports, news commentary materials, and enterprise development published on the public platform of WeChat, pay special attention to news reports on digital technology, information management, and green innovation, and collect 89 related reports with about 30,000 words.

The 'Textile Enterprise Knowledge Search and Green Innovation' research team comprises one associate professor, one professor, and five graduate students. The team members conduct on-the-spot investigations on the enterprise's production facilities, management platforms, and technical departments and directly observe and record critical information. These visits are designed to collect first-hand knowledge about digital technology advancements, knowledge-sharing practices, and green innovation initiatives and to adjust based on previously collected insights. The team developed an interview outline, visited the enterprise for on-site observation, and conducted in-depth interviews, mainly for researchers tasked with supervising digital technology initiatives. The interviewees were interviewed for about an hour to form a 30,000-word investigation report.

Complement and cross-validate with other data. Ensure the reliability and objectivity of the research data. Finally, a 105,000-word database is constructed, which provides detailed data support for the case study. Ensure the credibility of evidence with multiangle data sources. Based on the research questions based on data analysis, the proposition is presented, and relevant evidence is collected to verify the proposition to ensure the validity of the research. Through step-by-step coding, mining data categories, identifying category attributes, and exploring category relations, theoretical construction is carried out through inductive analysis, and theoretical research models are formed. Descriptive statistical results of various types of data are shown in table 1.

Specifically, corporate official website data and information on corporate websites include annual reports (quarterly reports), corporate social responsibility reports, corporate interim reports, etc. Open literature includes authoritative media news reports on enterprises and the publication of research papers. The on-site investigation and interview data provide detailed data support for the case study. The essential information is shown in table 2.

The current situation of green innovation, knowledge search, digital technology, and enterprise platform applications has been resolved through open channels and enterprise investigations. This research compiles digital technology's internal and action mechanisms to empower green innovation in textile enterprises.

Table 1

DESCRIPTION		
Serial number	**Data type**	**Data description**
1	Corporate official website data and information	About 45,000 words
2	Open literature	89 articles, about 30,000 words
3	On-site investigation and interview data	30,000 words

Table 2

BASIC INFORMATION OF CASE ENTERPRISE				
Enterprise name	**CS Enterprise**	**XS Enterprise**	**QF Enterprise**	**JT Enterprise**
Establishment time	2002	1999	1996	Year 2000
Belonging region	Linping District, Hangzhou City, Zhejiang Province	Wujiang District, Suzhou City, Jiangsu Province	Keqiao District, Shaoxing City, Zhejiang Province	Tongzhou District, Nantong City, Jiangsu Province
Personnel size (number)	100–199 persons	300–399 people	Less than 50 people	200–299 persons
Registered capital	RMB 100 million	$7.2 million	102.8978 million yuan	93 million yuan

RESULTS AND DISCUSSION

Data coding and analysis

This study's primary focus is examining the application of digital technology, knowledge exploration, and green innovation in textile enterprises. With this backdrop, this research delves into the influence mechanism of how textile enterprises leverage digital technology to facilitate green innovation, using the green innovation process of selected case enterprises as the primary narrative thread. This exploration includes case enterprise selection, digital technology application, knowledge search behaviours, and the resultant green innovation performance. The study completes the coding process by meticulously navigating through three stages: labelling, conceptualization, and categorization. This involves extracting relevant phenomena from textile enterprise data, assigning conceptual frameworks, and extracting categorical insights.

Open decoding

Open decoding means that, based on fully understanding the discourse meaning of written data, the content of text data is broken up. The text data is then disassembled into different nodes by encoding meaningful units [49, 50]. This study follows the step-by-step coding technology of programmed grounded theory and completes data processing.

First, the team members independently coded and recorded accordingly. Second, a comparative analysis is carried out. In the coding process, new concepts and categories are compared and revised repeatedly. The team members ask experts (Professors from Harbin Engineering University, Hebei University and Zhejiang Sci-Tech University) for verification when there is disagreement. Finally, the encoded data are compared with the relevant literature, re-encoded to help solve the previous questions, and finally achieve theoretical saturation. Before open coding, researchers set the corresponding numbers for each data to avoid confusion between the text data of interviewees in the data analysis process [50]. Then, the words, sentences, and paragraphs in the text materials are carefully read and thought repeatedly, taking "digital technology, knowledge search, and green innovation of textile enterprises" as the core of the question, constantly looking for and comparing the recurring meaning units, setting them as different nodes and setting codes to form the basic analysis units in the process of data analysis.

In the open coding phase, the researchers brainstormed the data to open up all potential possibilities in the data at the beginning of the analysis. By splitting the relevant data word by word and grasping the overall coherent meaning of the context of the words and sentences, the initial data are subdivided into micro-analysis units related to the research topic and relatively independent meaning, which are marked with labels and expressed as “aaXXX + phenomenon name”, forming an open coding label set as the primary material for spindle coding. Based on the open decoding process, this research explores the mechanism of digital technology empowerment in green innovation. After careful analysis, 56 concepts are retained and abstracted into 33 initial categories, such as “using computer technology to design textile product patterns and colours”, “using digital technology to realize product visualization”, “imitation production equipment creation and production scheme replication”, and “textile enterprises create production platforms for joint manufacturing”. The corresponding relationship between concepts and categories in open decoding is shown in table 3.

Table 3

SOME EXAMPLES OF THE ‘LABELLING’ PROCESS

Data	Level 1: Open Coding: Labelling
A In traditional textile pattern design, digital technology is used to achieve colour without limit. Under computer digital technology, as long as the designer can think of the colour, it can be expressed through digital technology, but also the use of digital technology to expand the textile pattern in the three-dimensional space form, such as the matching textile pattern simulation in three-dimensional space, the actual effect of a comprehensive test, to more quickly determine the colour matching, fabric and so on. Designers are utilizing software such as Adobe Illustrator, CorelDRAW, and Adobe Photoshop for pattern design. After completing the first draft, the computer can be passed to the enterprise and consumers for visual inspection. At the same time, in the context of digital technology, designers can achieve remote control and product style adjustment. From a practical point of view, the application of digital technology in modern textile pattern design, on the one hand, created a new textile pattern design style, on the other hand, to achieve the transformation of human art design. ...	aa001 Using computer technology to design patterns and colours of textile products aa002 Using digital technology to realize product visualization aa003 Acquisition of new knowledge aa004 Explore the needs of emerging markets aa005 Enterprises actively supply more environmentally friendly textile products to meet the needs of consumers for green environmental protection products
B Based on traditional manufacturing, the intelligent production plan now incorporates more intelligent new technologies, business data, process flow data, and equipment data, allowing for batch replication and real-time production schedule tracking. Digitization, intelligence, and information transmission in production management enable departments to analyse and provide feedback on production capacity data. The input values include the order number and delivery cycle. B In recent years, enterprises have conducted thorough market research, examining domestic and foreign textile trends, consumer preference shifts, and competitor strategies. Analysis reveals a growing demand for eco-friendly, functional, and personalized customized products. Recognizing this opportunity, enterprises have realigned their product structures, bolstered R&D and production of eco-friendly materials and functional fabrics, and enhanced personalized customization services. Market demand has fuelled increased investment in R&D for new fibre materials like graphene and bio-based fibres, as well as intelligent production technology. Technological innovation has led to the development of higher-value, market-competitive products. To market these products, enterprises leverage social media, e-commerce platforms, and other diverse channels, fostering stronger consumer interaction and staying attuned to market feedback and evolving demands. B Given the limitation of production capacity, equipment upgrading and process improvement was carried out. Automated production lines and intelligent warehousing and logistics systems were introduced to improve production efficiency and product quality. Strengthen cooperation with supply chain partners, realize resource and risk sharing, and enhance the efficiency and competitiveness of the entire industrial chain. Actively explore cross-border integration with other industries, such as deep integration with information technology, biotechnology, and other fields. Through cross-border cooperation, new application fields and market space can be expanded. ...	bb001 Imitation production equipment creation and production plan replication bb002 Textile enterprises build production platforms for joint manufacturing bb003 Identify and grasp market opportunities bb004 Break down the limitations and barriers to knowledge and production capacity bb005Improve the existing knowledge level according to current needs bb006Expand the knowledge reserve of textile enterprises according to market demand bb007 Enterprises provide environmentally friendly textile products with improved production processes in the existing market bb008 Enterprises provide greener and more environmentally friendly textile products. bb009 Style design of textile green products bb010 Colour matching of textile green products bb011 Fabric Design of Green Textile Products

C Consumers understand and purchase textiles through online platforms and experience purchase or pick-up services in offline physical stores. Enterprises can establish official websites or open flagship stores on mainstream e-commerce platforms to display information, pictures, and prices of various textiles for consumers to browse and purchase. We use social media platforms such as Weibo, WeChat, and TikTok to carry out brand and product promotion to attract the attention of potential customers. Provide convenient online booking and payment functions so consumers can complete the purchase process anytime and anywhere. C Through establishing a perfect order processing system, enterprises have realized the capture and processing of order data from multiple data sources such as e-commerce platforms and ERP systems. Through data analysis and application, the enterprise can adjust the production plan promptly, optimize inventory management, and provide customers with more accurate logistics and distribution services. This not only improves the enterprise's operation efficiency and market competitiveness but also wins wide customer acclaim. C With the rapid development of science and technology, textile technology is constantly upgrading. Textile enterprises keep up with the pace of the times and actively enter the field of emerging textile technology. Enterprises increase investment in research and development of new materials, processes, and technologies and continuously launch high-performance textiles with independent intellectual property rights. At the same time, enterprises also cooperate with scientific research institutions, universities, and other units to jointly overcome technical problems and promote the innovation and development of textile technology. This forward-looking technology layout and muscular R&D strength allow enterprises to remain leading in the fierce market competition. ...	cc001 Adopt online to offline to provide services for consumers cc002 Grasping platform order data for processing cc003 Enter the new textile technology field cc004 Explore new channels of the textile industry and market cc005 Dare to bear the high cost of searching for new textile knowledge cc006 Dare to bear the maladjustment and risks that may be brought about by the application of new textile technology cc007 Enterprises actively explore more fashionable and popular green textile products; cc008Enterprises actively apply new fabrics to improve the quality of green products cc008 Enterprises actively apply new fabrics to improve the quality of green products
D The enterprise introduces the Internet of Things technology to realize real-time monitoring and data analysis of production equipment. Through the intelligent scheduling and scheduling system, the enterprise can automatically adjust the production plan, optimize the production process, and improve production efficiency by more than 20%. At the same time, by accurately controlling the production process and parameters, the company has also successfully reduced the product failure rate and improved product quality and customer satisfaction. D Fully implements the precise control strategy of information flow and logistics. It includes formulating clear information management policies; establishing standards and processes for information collection, processing, distribution, and confidentiality; establishing an information management platform to realize centralized management, classified storage, efficient retrieval and sharing of information resources; and promoting inter-departmental collaboration. At the same time, effective information communication channels should be built, and internal mail, instant messaging, regular meetings, and video conferences should be used to ensure a smooth flow of information and encourage employee communication and collaboration. In addition, advanced information technologies such as ERP and WMS are introduced to achieve comprehensive resource management and accurate inventory control. Big data analysis is used to provide strong support for decision-making. In terms of logistics, set up a special logistics management department to achieve process reengineering and professional management; improve the logistics system, reduce costs, and improve efficiency by rationally planning routes, reducing inventory and turnover links; introducing automated warehousing equipment and logistics tracking system to improve storage, pickup and transportation efficiency and service quality; and according to the actual selection of the appropriate logistics model, such as outsourcing or alliance, to reduce costs and enhance flexibility. At the same time, a risk management plan should be developed to deal with potential risks. D Textile enterprises know that knowledge is constantly developing and updating. Therefore, enterprises continue improving and perfecting reserve knowledge through continuous knowledge search and learning. Enterprises use advanced technologies such as big data and artificial intelligence to screen and analyse massive amounts of information and discover new knowledge points and technical trends. At the same time, enterprises also pay attention to maintaining close contact with experts and scholars inside and outside the industry and keep abreast of industry trends and technological progress. This continuous knowledge search and improvement mechanism keeps enterprises' knowledge reserves always keeping pace with the times and provides strong support for the innovation and development of enterprises. ...	dd001 Efficient Internet of Things Link Intelligent Scheduling and Scheduling dd002 Realize accurate management and control of information flow and logistics dd003 Enterprises complete the improvement of reserved knowledge through knowledge search dd004 Enterprises improve and extend the reserved knowledge in different scenarios, processes, and links through knowledge search dd005 Enterprises vigorously search for environmental protection management information; dd006 Enterprises actively explore the information of emerging textile technologies and complete the knowledge search for improving production processes or processes such as printing and dyeing; dd007 Access to relevant policy information; dd008 Enterprises agree that textile products should meet the needs of green environmental protection dd009Realize the greening of the whole production process

Spindle decoding

The principal axis coding refines the relationship between concepts based on the results of open coding. Among them, principal axis coding refers to the in-depth classification, synthesis, and organization of text data by researchers using the most important or frequent open coding, finding the code numbers with semantic relations, and associating them with each other [49, 50]. Through this coding paradigm, concepts and categories are linked; that is, by using the conditions of a phenomenon, the actions and results taken against the situation are comprehensively considered to master the phenomenon's essence. Principal axis coding aims to cluster the initial categories refined by open coding again, discover and establish the potential relationships among the initial categories, abstract and form a higher-level principal category, and prepare for the next step of finding story clues.

Further carry out principal axis and selective coding around the text data, classify, refine, and comprehensively adjust again, merge code numbers with similar meanings, and sort out the correlation between code numbers. Research team classifies 33 code numbers into 14 more refined ones using similar, heterogeneous, horizontal, and vertical comparisons. Clustering analysis is carried out on relatively independent open decoding results, and the principal axis decoding is obtained to analyze the conceptual hierarchy relationship of each category. Open decoding is formed into the initial category for integration. Finally, 14 main categories are abstracted and summarized, and the results of spindle coding are shown in table 4.

Table 4

MAIN CATEGORY, SUBCATEGORY, AND INITIAL CATEGORY

Main category	Subcategory	Initial category
A01 Digital product design technology	AA01 Textile colour design AA02 Textile pattern simulation AA03 Intelligent visual inspection of finished products	aa001 Using computer technology to design patterns and colours of textile products aa002 Using digital technology to realize product visualization
A02 Digital manufacturing technology	AA04 Transformation of production equipment AA05 Replication of production plan AA06 Production platform building	bb001 Imitation production equipment creation and production plan replication bb002 Textile enterprises build production platforms for joint manufacturing
A03 Digital sales service technology	AA07 Online to offline AA08 Order collection and processing AA09 Supply chain link AA10 Logistics service	cc001 Adopt online to offline to provide services for consumers cc002 Grasping platform order data for processing dd001 Efficient Internet of Things Link Intelligent Scheduling and Scheduling dd002 Realize accurate management and control of information flow and logistics
A04 Exploring new knowledge and market opportunities	AA11 Acquisition of new knowledge AA12 Demand exploration AA13 Opportunity identification AA14 Break through barriers	aa003 Acquisition of new knowledge aa004 Explore the needs of emerging markets bb003 Identify and grasp market opportunities bb004 Break down the limitations and barriers to knowledge and production capacity
A05 Channel excavation	AA15 Perception of new technology AA16 Exploration of market channel	cc003 Enter the new textile technology field cc004 Explore new channels of the textile industry and market
A06 Risk-taking	AA17 Knowledge search cost bearing AA18 Risk of new knowledge application	cc005 Dare to bear the high cost of searching for new textile knowledge cc006 Dare to bear the maladjustment and risks that may be brought about by the application of new textile technology
A07 Knowledge absorption and reserve	AA19 Improve the level of knowledge AA20 Expand knowledge reserves	bb005 Improve the existing knowledge level according to current needs bb006 Expand the knowledge reserve of textile enterprises according to market demand
A08 Knowledge expansion and extension	AA21 Reserve knowledge expansion AA22 Extension of reserve knowledge	dd003 Enterprises complete the improvement of reserved knowledge through knowledge search dd004 Enterprises improve and extend the reserved knowledge in different scenarios, processes, and links through knowledge search

Table 4 (continuation)

Main category	Subcategory	Initial category
A09 Information Acquisition	AA23 Management information acquisition AA24 Access to technical information AA25 Access to relevant policy information	dd005 Enterprises vigorously search for environmental protection management information dd006 Enterprises actively explore the information of emerging textile technologies and complete the knowledge search for improving production processes or processes such as printing and dyeing dd007 Access to relevant policy information
A10 Green product improvement	AA26 Improvement of the production process of green products AA27 Environmental protection of green products is improved	bb007 Enterprises provide environmentally friendly textile products with improved production processes in the existing market bb008 Enterprises provide greener and more environmentally friendly textile products
A11 Improve the quality of green products	AA28 Style improvement of textile green products AA29 Fabric upgrade of textile green products	cc007 Enterprises actively explore more fashionable and popular green textile products cc008 Enterprises actively apply new fabrics to improve the quality of green products
A12 Green product design	AA30 Enterprises actively try to learn fashionable, advanced, and environmentally friendly green textile products through learning and training	bb009 Style design of textile green products bb010 Color matching of textile green products bb011 Fabric Design of Green Textile Products
A13 Green product supply	AA31 Improve the supply of green textile products AA32 Meet the demand for green products	aa005 Enterprises actively supply more environmentally friendly textile products to meet the needs of consumers for green environmental protection products
A14 Green product demand perception	AA33 Textile products should meet the green demand	dd008 Enterprises agree that textile products should meet the needs of green environmental protection dd009 Realize the greening of the whole production process

Selective coding

Selective coding further integrates and refines existing categories more abstractly, generates and explores the main categories around the topic, and thus establishes the relationship between categories [49–50]. Researchers set up three new nodes around the theme of “Digital Technology and Green Innovation” in the above 14 codes, namely, “Digital Technology”, “Knowledge Search”, and “Green Innovation”.

Research team analyse 14 main categories. “Digital product design technology, digital processing and manufacturing technology; Digital sales and service technology” is the digital background on which green innovation depends, and products, manufacturing, and service are the core categories of digital technology in textile enterprises. It can be summarized as “digital technology”. “New knowledge and market opportunity exploration”, “channel mining”, and “risktaking” can be summarized as “prospective research”; “Knowledge absorption and storage”, “knowledge expansion and extension”, and “information acquisition” can be summarized as “reactive search”; prospective research and reflective search together constitute knowledge search; “incremental innovation” and “radical innovation” are the two-dimensional effects of green innovation, and finally 14 main categories are summarized and abstracted into three core categories.

Furthermore, analyse the 14 main categories formed by selective coding. Among them, ‘A01 Digital product design technology’, ‘A02 Digital manufacturing technology’, and ‘A03 Digital sales service technology’ are the digital background of green innovation and the core digital technology category in textile enterprises. The three are summarized as ‘A1 Digital technology’. ‘A04 Exploring new knowledge and market opportunities’, ‘A05 Channel excavation’, and ‘A06 Risk-taking’. can be summarized as ‘A2 Prospective research’; ‘A07 Knowledge absorption and reserve’, ‘A08 Knowledge expansion and extension’, and ‘A09 Information Acquisition’ can be summarized as ‘A3 Reactive search’. Prospective research and Reactive search constitute the ‘knowledge search’; ‘A10 Green product improvement’ and ‘A11 Improve the quality of green products’ can be summarized as A4’ Incremental innovation’, ‘A12 Green product design’, ‘A13 Green product supply’, and ‘A14 Green product demand perception’ can be summarized as ‘A5 Radical innovation’, ‘Incremental innovation’ and ‘Radical innovation’ are two dimensions of green innovation.

With the support of digital technology, sampled enterprises realize information exchange through element links, thus forming the driving force and way of organizational system innovation. Establish trust relationships through multi-agent interaction to realize organizational strategic innovation through collaborative governance. Team cohesion is formed through situational interaction, common development goals are triggered, and organizational structure innovation is promoted through the in-depth development of organizational integration. The storyline around this core category is as follows: first, textile enterprises realize deep digital technology by building digital networks, building digital platforms, upgrading digital technology and data management, and realizing multi-agent new knowledge and market opportunity exploration, channel mining, knowledge management, and information acquisition through digital technology. Under the joint action of digital technology and knowledge search, the trust mechanism and the learning mechanism are used extensively to adjust the learning behaviour of organizational subjects and promote the realization of green innovation goals.

Clustering analysis is carried out on the relatively independent open decoding results, and the principal-axis decoding is obtained to analyse the conceptual hierarchy relationship of each category. Open decoding is formed into the initial category for integration. Finally, five main categories are abstracted and summarized, and the results of principal axis decoding are shown in table 5.

In green innovation, textile enterprises should improve their keen grasp and adjustment ability of technical and policy environments, apply digital technology to green innovation, realize value process reshaping and knowledge search, and drive green innovation. Figure 1 summarizes the mechanism of influence of textile companies using digital technology to realize knowledge search and improve green innovation.

The remaining quarter of the data is used to test the saturation of grounded theory. After analyzing the materials, no new definition and type are found, so the model constructed by grounded theory has passed the theoretical saturation test.

Table 5

MAIN CATEGORIES FORMED BY SELECTIVE CODING

Category	Concept
A1 Digital technology	A01 Digital product design technology; A02 Digital manufacturing technology; A03 Digital sales service technology
A2 Prospective research	A04 Exploring new knowledge and market opportunities; A05 Channel excavation; A06 Risk-taking
A3 Reactive search	A07 Knowledge absorption and reserve; A08 Knowledge expansion and extension; A09 Information Acquisition
A4 Incremental innovation	A10 Green product improvement; A11 Improve the quality of green products
A5 Radical innovation	A12 Green product design; A13 Green product supply; A14 Green product demand perception

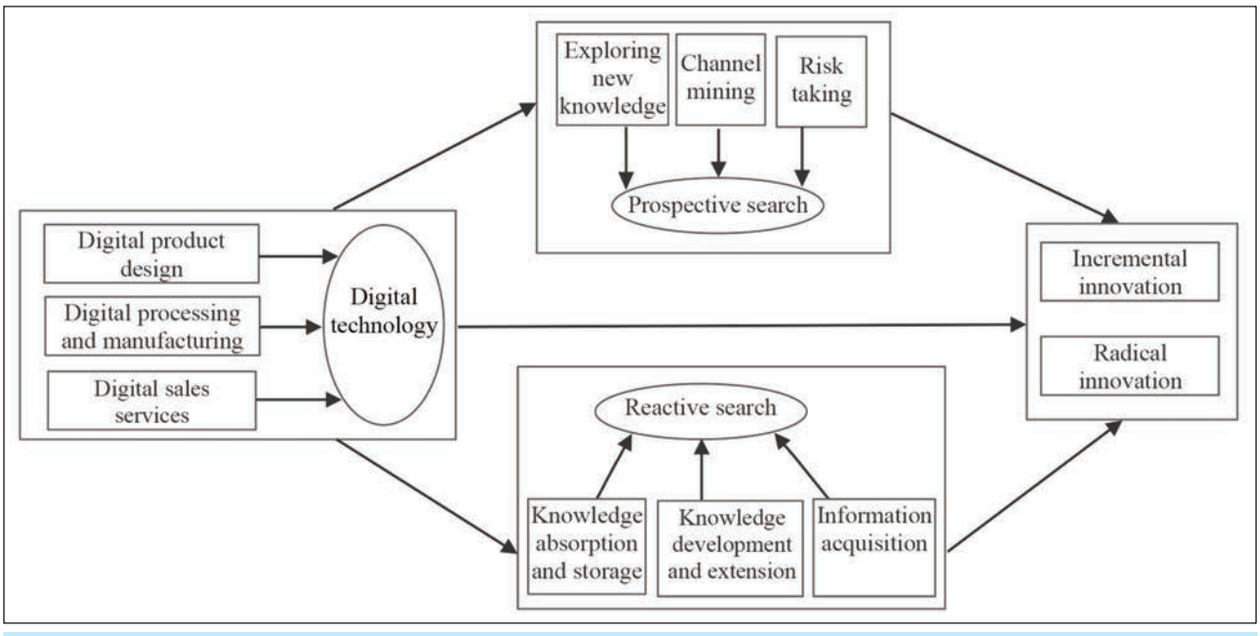

Fig. 1. The influence mechanism

The findings align with those of Matarazzo et al. [38], emphasizing that textile enterprises must follow digital trends, invest in digital reserves, and improve green development. We highlight R&D in the design, processing, and sales/service of digital products, enhancing the digital framework. From a resource-based perspective and industrial upgrading theories, we demonstrate that digital technology advances green R&D. Enterprises use big data to digitize consumer patterns, analyse demand-side data, predict fashion trends, and accurately capture marketing dynamics. With the deepening of digital technology in the design of green products and the innovation of textile enterprises, textile enterprises can use digital technology and platforms to continuously strengthen the green performance of products, thus improving the performance of green incremental innovation.

This research extends radical innovation concepts, complementing Brem et al. [25] and Agostini and Nosella [26]. This research explores the digital processes of textile enterprises to gain new knowledge and market opportunities and mine information to enhance risk-taking. This research also complements Abbas and Sagsan [8] on knowledge management for sustainable performance.

Supplementing Nambisan et al. [2], this research emphasizes the positive impact of digital technology on green innovation, enriching knowledge-level insights. Like Urbinati et al. [39], this research discusses the impact of digital technology on green innovation, highlighting the pivotal role of knowledge search. This further complements the research results of Kauffman and Weber [41] from the organizational level. This research improves knowledge search ability by applying digital technology in different fields. For example, this research found that increasing the efficient supply of textile products and services with a low carbon promotes the concept of textile products consumption with a low carbon life and establishing a traceability certification system for recycling textile materials, thus reducing the waste of textile resources and reducing carbon emissions.

Cross-border technical and market knowledge searches improve innovation performance and breakthroughs, supporting green innovation through creativity in knowledge. This research expands on Phelps et al. [51], clarifying knowledge management as an active organizational search behavior under digital technology. Digital platforms facilitate knowledge sharing, encouraging exchange and precise green innovation demand identification.

Digital technology integrates with multilevel factors, improving knowledge search, market access, and green innovation, according to Agostini and Nosella [26]. This expands Chang et al. [27] and Agostini and Nosella's [26] work, promoting data openness and interconnectedness. Digital technology decomposes organizational processes, facilitating structural reconstruction.

CONCLUSIONS

Using grounded decoding analysis from a multi-case study approach, we selected four textile enterprises as representative samples. Through interviews and factor analysis, this research applied grounded theory to qualitatively investigate the intersection of digital technology, knowledge search, and the construction of green innovation. This deliberate exploration delves into the green innovation process within enterprises amidst the backdrop of emerging technologies. This research constructs a theoretical framework on the application of digital technology in textile enterprises, examines its evolutionary process and pivotal mechanisms that influence green innovation, and consolidates the empowerment mechanism of digital technology for green innovation in textile enterprises from a knowledge search perspective. Key findings reveal that digital technology enhances information exchange capabilities through the interconnection of elements and knowledge exchange in knowledge search, thus dynamically supporting organizational system innovation. Second, this research reveals multi-agent interaction in knowledge search, fostering trust between internal and external organizational members and encouraging strategic innovation. Thirdly, this research reveals that digital technology enhances team cohesion by facilitating scenario-based interactions within knowledge search. This collaborative approach fosters the integration of diverse perspectives and promotes further development, ultimately acting as a catalyst for organizational structural innovation.

This paper provides a comprehensive analysis of digital processes in textile enterprises, focusing on how they acquire new knowledge, explore market opportunities, and enhance risk-taking capabilities through digital technology. The practical implications of this research are significant for textile enterprises and the industry at large. Firstly, the findings underscore the importance of digital technology in transforming traditional textile pattern design processes, enabling designers to create limitless colour and pattern combinations and facilitating real-time visualization and adjustment. Secondly, the research emphasizes the role of digital manufacturing technology in optimizing production processes and enhancing product quality. By incorporating intelligent production plans, real-time monitoring, and data analysis, textile enterprises can significantly reduce product failure rates and increase production efficiency. Furthermore, the study underscores the significance of digital sales service technology in expanding market reach and improving customer experience. By leveraging online platforms and social media for brand promotion and order processing, textile enterprises can tap into new customer segments and streamline the purchasing process, fostering customer loyalty and driving sales growth. Additionally, the research highlights the importance of proactive knowledge seeking and risk-taking in exploring new knowledge and market opportunities. By staying abreast of industry trends and technological advancements, textile enterprises can identify and seize market opportunities, leading to incremental and radical innovations in green product design and supply. Finally, the practical implications

of this research extend to policymakers and stakeholders in the textile industry. By understanding the transformative potential of digital technology, they can create supportive policies and infrastructures that facilitate the adoption and integration of digital processes in textile enterprises. This will drive sustainable growth and innovation in the industry, ultimately benefiting consumers and the environment.

In conclusion, this paper demonstrates the critical role of digital processes in shaping the future of textile enterprises. By embracing digital technology, textile enterprises can enhance design efficiency, optimize production processes, expand market reach, and foster innovation, ultimately driving sustainable growth and competitiveness in the industry. China's textile enterprises have witnessed significant advances in digital technology, yet this study focused solely on four cases. The applicability of the theoretical model to textile and other manufacturing enterprises remains to be determined. Future research should employ cross-case analysis to enhance sampling and empirical methods to refine the model. Additionally, qualitative and quantitative methods will be combined to assess the generality of the conclusions and compare the differences among various types of enterprises. Moreover, the regional focus of the current study limits its conclusions. Future stratified sampling and large-scale investigations will examine the variations in digital technologies across regions and organizational structures, revealing the underlying mechanisms.

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REFERENCES

[1] Giones, F., Brem, A., *Digital technology entrepreneur: A definition and research agenda*, In: Technology Innovation Management Review, 2017, 7, 5

[2] Nambisan, S., *Digital entrepreneur: Toward a digital technology perspective of entrepreneur*, In: Enterprise Theory and Practice, 2017, 41, 6, 1029–1055

[3] Pagani, M., Pardo, C., *The impact of digital technology on relationships in a business network*, In: Industrial Marketing Management, 2017, 67, 185–192

[4] Evangelista, R., Guerrieri, P., Meliciani, V., *The economic impact of digital technologies in Europe*, In: Economics of Innovation and New Technology, 2014, 23, 8, 802–824

[5] Lavis, N., Robertson, D., Woodside, J.M., McLeod, C.B., Abelson, J., *How can research organizations more effectually transfer research knowledge to decision makers?*, In: The Milbank Quarterly, 2003, 81, 2, 221–248

[6] Sokhanvar, S. Matthews, J., Yarlagadda, P., *Importance of knowledge management processes in a project-based organization: A case study of research enterprise*, In: Procedia Engineering, 2014, 97, 1825–1830

[7] Arfi, B., Hikkerova, L., Sahut, J.M., *External knowledge sources, green innovation and performance*, In: Technical Forecasting and Social Change, 2018, 129, 210–220

[8] Abbas, J., Sagsan, M., *Impact of knowledge management practices on green innovation and corporate sustainable development: A structural analysis*, In: Journal of Cleaner Production, 2019, 229, 611–620

[9] Schiederig, T., Tietze, F., Herstatt, C., *Green innovation in technology and innovation management-an exploratory literature review,* In: R&D Management, 2012, 42, 2, 180–192

[10] Takalo, K., Tooranloo, H.S., *Green innovation: A systematic literate review*, In: Journal of Cleaner Production, 2021, 279, 122, 474

[11] Zameer, H., Wang, Y., Yasmeen, H., *Reinforcing green competitive advantage through green production, creativity and green brand image: implications for cleaner production in China*, In: Journal of Cleaner Production, 2020, 247, 119119

[12] Song, W., Yu, H., *Green innovation strategy and green innovation: The roles of green creativity and green organizational identity*, In: Corporate Social Responsibility and Environmental Management, 2018, 25, 2, 135–150

[13] Lian, G., Xu, A., Zhu, Y., *Substantive green innovation or symbolic green innovation? The impact of ER on enterprise green innovation based on the dual moderating effects*, In: Journal of Innovation & Knowledge, 2022, 7, 3, 100203

[14] Chang. H., Chen, Y.S., *Green organizational identity and green innovation,* In: Management Decision, 2013, 51, 5, 1056–1070

[15] Marti'nez-Ros, E., Kunapatarawong, R., *Green innovation and knowledge: The role of size*, In: Business Strategy and the Environment, 2019, 28, 6, 1045–1059

[16] Alborn-Morant, G., Leal-Milla'n, A., Cepeda-Carrio'n, G., *The antecedents of green innovation performance: A model of learning and capabilities*, In: Journal of Business Research, 2016, 69, 11, 4912–4917

[17] Wen, H., Lee, C.C., Zhou, F., *Green credit policy, credit allocation efficiency and upgrade of energy-intensive enterprises*, In: Energy Economics, 2021, 94, 105099

[18] Tseng, M.L., Wang, R., Chiu, A.S., Geng, Y., Lin, Y.H., *Improving performance of green innovation practices under education,* In: Journal of Cleaner Production, 2013, 40, 71–82

[19] Chen, Y.S., *The driver of green innovation and green image-green core comparison*, In: Journal of Business Ethics, 2008, 81, 531–543

[20] Aguilera-Caracuel, J., Ortiz-de-Mandojana, N., *Green innovation and financial performance: An institutional approach*, In: Organization & Environment, 2013, 26, 4, 365–385

[21] Wanzenböck, I., Wesseling, J.H., Frenken, K., Hekkert, M.P., Weber, K.M., *A framework for mission-oriented innovation policy: Alternative pathways through the problem–solution space*, In: Science and Public Policy, 2020, 47, 4, 474–489

[22] Li, D., Zhao, Y., Zhang, L., Chen, X., Cao, C., *Impact of quality management on green innovation*, In: Journal of Cleaner Production, 2018, 170, 462–470

[23] Lin, H., Zeng, S.X., Ma, H.Y., Qi, G.Y., Tam, V.W., *Can political capital drive corporate green innovation? Lessons from China*, In: Journal of Cleaner Production, 2014, 64, 63–72
[24] Zhang, Y., Sun, J., Yang, Z., Wang, Y., *Critical success factors of green innovation: Technology, organization and environment readiness*, In: Journal of Cleaner Production, 2020, 264, 121701
[25] Brem, A., Nylund, P.A., Schuster, G., *Innovation and de facto standardation: The influence of dominant design on innovative performance, radical innovation, and process innovation*, In: Technovation, 2016, 50, 79–88
[26] Agostini, L., Nosella, A., *Enhancing radical innovation performance through intellectual capital components*, In: Journal of Intellectual Capital, 2017, 18, 4, 789–806
[27] Chang, Y.C., Chang, H.T., Chi, H.R., Chen, M.H., Deng, L.L., *How do established firms promote rational innovation performance? The organizational capabilities view,* In: Technovation, 2012, 32, 7-8, 441–451
[28] Liu, K., Xue, Y., Chen, Z., Miao, Y., *The spatial evolution and influencing factors of urban green innovation in China*, In: Science of the Total Environment, 2023, 857, 159426
[29] de Medeiros. F., Vidor, G., Ribeiro, J.L.D., *Driving factors for the success of the green innovation market: A relationship system proposal*, In: Journal of Business Ethics, 2018, 147, 327–341
[30] Chi, N.T.K., *Driving factors for green innovation in agricultural production: An empirical study in an emerging economy*, In: Journal of Cleaner Production, 2022, 368, 132965
[31] Lin, Y., Ho, Y.H., Chiang, S.H., *Organizational regulations of green innovation implementation in the logics industry*, In: International Journal of Organizational Innovation, 2009, 2, 1
[32] Borsatto, M.L.S., Bazani, C.L., *Green innovation and environmental regulations: A systematic review of international academic works*, In: Environmental Science and Concentration Research, 2021, 1–18
[33] Cuerva, C., Triguero-Cano, A., Co'rcoles, D., *Drivers of green and non-green innovation: empirical evenness in Low-Tech SMEs*, In: Journal of Cleaner Production, 2014, 68, 104–113
[34] Asadi, S., Pourhashemi, S.O., Nilashi, M., Abdullah, R., Samad, S., Yadegaridehkordi, E., Razali, N.S., *Investigating influence of green innovation on sustainability performance: A case on Malaysian hotel industry*, In: Journal of Cleaner Production, 2020, 258,120, 860
[35] Liu, J., Duan, Y., Zhong, S., *Does Green Innovation Support Carbon Emission Intensity? New event from China*, In: Environmental Science and Survey Research, 2022, 29, 57, 86722–86743
[36] Küçükoğlu, M.T., Pınar, R.İ., *Positive influences of green innovation on company performance*, In: Procedia-Social and Behavioral Sciences, 2015, 195, 1232–1237
[37] Wang, D., Chen, S., *Digital transformation and enterprise resilience: evidence from China*, In: Sustainability, 2022, 14, 21, 14218
[38] Matarazzo, M., Penco, L., Profumo, G., Quaglia, R., *Digital transformation and customer value creation in Made in Italy SMEs: A dynamic capabilities perspective*, In: Journal of Business Research, 2021, 123, 642–656
[39] Urbinati, A., Chiaroni, D., Chiesa, V., Frattini, F., *The role of digital technologies in open innovation processes: an exploratory multiple case study analysis*, In: R&D Management, 2020, 50, 1, 136–160
[40] Karimi, J., Walter, Z., *The role of dynamic capabilities in responding to digital disruption: A factor-based study of the newspaper industry*, In: Journal of Management Information Systems, 2015, 32, 1, 39–81
[41] Kauffman, R.J., Weber, T.A., *The Digital Transformation of Vertical Organizational Relationships*, In: Journal of Management Information Systems, 2018, 35, 3, 837–839
[42] Limoges, C., Scott, P., Schwartzman, S., Nowotny, H., Gibbons, M., *The new production of knowledge: The dynamics of science and research in contemporary societies*, In: The New Production of Knowledge, 1994, 1–192
[43] Ozga, J., *Governing knowledge: Research steering and research quality*, In: European Educational Research Journal, 2008, 7, 3, 261–272
[44] Landry, R., Amara, N., Lamari, M., *Utilization of social science research knowledge in Canada*, In: Research Policy, 2001, 30, 2, 333–349
[45] Armbrecht Jr., F.R., Chapas, R.B., Chappelow, C.C., Farris, G.F., Friga, P.C.N., Hartz. A., Whitwell, G.E., *Knowledge management in research and development*, In: Research Technology Management, 2001, 28–48
[46] Alavi, M., Leidner, D.E., *Knowledge management and knowledge management systems: Conceptual foundations and research issues*, In: MIS Quarterly, 2001, 107–136
[47] Kristjanson, P., Reid, R.S., Dickson, N., Clark, W.C., Romney, D., Puskur, R., Grace, D., *Linking international financial research knowledge with action for sustainable development,* In: Proceedings of the National Academy of Sciences, 2009, 106, 13, 5047–5052
[48] Nonaka, I., Takeuchi, H., *The knowledge-creating company*, In: Harvard Business Review, 2007, 85, 7/8 162
[49] Matavire, R., Brown, I., *Profiling ground theory applications in information systems research*, In: European Journal of Information Systems, 2013, 22, 119–129
[50] Urquhart, C., Lehmann, H., Myers, M.D., *Putting the'theory'back into ground theory: guidelines for ground theory studies in information systems*, In: Information Systems Journal, 2010, 20, 4, 357–-381
[51] Phelps, C., Heidl, R., Wadhwa, *Knowledge, networks, and knowledge networks: A review and research agenda*, In: Journal of Management, 2012, 38, 4, 1115–1166

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