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# The Power of Sustainability in the “Black Swan” Event: Entrepreneurial Cognition of Top Management Team and Dual Business Model Innovation

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**Abstract:** In the dynamic environment where “Black Swan” events occur frequently, the dual business model innovation (DBMI) which has both proactive and reactive characteristics is the core force for the enterprises to turn crises into opportunities and achieve their survival and sustainability. However, prevailing views do not clearly explain how to drive dual business model innovation. Based on the upper echelon theory, this study developed a multiple mediation model, which links entrepreneurial cognition of the top management team (TMT), knowledge search with dual business model innovation. By taking the data of 217 TMTs, the hypotheses are verified. The results show that TMT’s configuration cognition, willing cognition, and ability cognition all have a positive effect on both proactive and reactive business model innovation. Knowledge search acts as a “bridge” between TMT’s entrepreneurial cognition and DBMI. Greater entrepreneurial cognition can guide exploratory and exploitative knowledge searches and promote the DBMI. The results also show the mediating effect between different entrepreneurial cognition and DBMI is not completely consistent, and a partial mediation effect exists associating configuration cognition with DBMI, but a full mediation effect is present between other cognitions and DBMI. These results provide more understanding to the formation of dual business model innovation under the impact of COVID-19.

**Keywords:** entrepreneur cognition; dual business model innovation; knowledge search; top management team; “black swan” event



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## 1. Introduction

The COVID-19 (Corona Virus Disease 2019) outbreak, which has spread throughout the world, has completely disrupted global operations and has once again exposed humans to the terrible destruction caused by the occurrence of a black swan event. The black swan event is frequently referred to as a highly unpredictable and unique incident that may generate a chain of negative responses or even market breakdowns, and it can emerge in any field, including financial markets, politics, and personal life. According to Taleb’s view [1], black swan events are rare, and there is no proof of their existence based on history, yet they may be exceedingly stunning, as witnessed by the 9/11 incident in the United States, Brexit in 2017, and SARS in China in 2003.

Faced with the unexpected black swan of the COVID-19 epidemic, numerous companies were in trouble and even on the brink of bankruptcy, but there were also some firms seeking opportunities in the midst of crisis and making great progress. Excluding industry factors, the differences in business model innovation among companies are significant contributors for such extreme states of business performance, akin to being in opposing worlds of ice and fire [2].

Business model innovation enables firms to dynamically modify their value proposition and profit model in response to external factors, driving the sustainable development

of the organization. Scanning the companies that have risen in the “black swan” event, whether it is Alibaba and JD.com, which gained fast development during the SARS period, or DMALL and Xiaomi, which thrived in the COVID-19 widespread disease, what they all have in common is the duality of business model innovation. Dual business model innovation is defined as a comprehensive innovation pattern that combines proactive and reactive innovation, which can effectively balance and align the organization’s long-term and short-term strategic goals, as well as handle extreme unpredictability [3]. Proactive business model innovation, in particular, focuses on the future and enables organizations to respond quickly in the face of crises. Reactive business model innovation is the source of profitability for organizations, ensuring that they have enough momentum and resources to support long-term goals and outperform competitors [4]. It is evident that dual business model innovation is the key for organizations to foster organizational resilience and overcome fragility in a dynamic environment. As a result, uncovering the antecedents of dual business model innovation has become a critical issue that has garnered increasing attention.

The top management team (TMT) has been identified as a critical force for driving business model innovation [5]. Scholars have confirmed the impact of TMT characteristics on business model innovation from the perspectives of structure, competence, and behavior, but the relationship between TMT cognitive style and business model innovation has gone unnoticed [6]. Meanwhile, as a distinct cognitive model, entrepreneurial cognition can better deal with complex business environments. While some scholars believe entrepreneurial cognition is a human capital that is unique to entrepreneurs, a growing number of cases show how corporate business models are dramatically altered when top management teams think like entrepreneurs [7]. Particularly when faced with high uncertainty and an unstructured environment, decision makers with entrepreneurial cognition are more likely to steer the firm through the crisis. On the other hand, dual business model innovation is a specific representation of organizational duality, but there is little discussion on the dual characteristics of business model innovation in the framework of current organizational duality theories, which focus more on dual leadership [8], dual learning [9], and dual technology innovation [10]. Furthermore, most research on the antecedents of business model innovation lacked distinction of innovation types, and very little literature has attempted to integrate the various business model innovations into an integrated analytical framework in a dualistic form. Overall, we know little about whether and how entrepreneurial cognition of TMT influences dual business model innovation, despite the fact that dual business model innovation has expressed significant potential power in enabling organizations to cope with the complexity of the post-black swan situation.

To address this issue, the purpose of our research is to develop a multiple mediated effects model based on upper echelon theory in order to examine the mechanism of the entrepreneurial cognition of TMT on dual business model innovation.

We begin by analyzing the current literature on dual business model innovation and entrepreneurial cognition to clarify their definitions, highlighting how the previous research maybe limited with respect to explaining how executive teams affect dual business model innovation. We then draw from higher echelon theory to identify the entrepreneurial cognition of TMT as an antecedent to interpret its potential impact on dual business models, and positions knowledge search as a mediating variable based on knowledge management perspective to interpret the process from executive thinking to business model innovation. Finally, we collected 219 self-reported data from top corporate decision makers in China as a sample, using the nested model comparison method to identify the best-fit model and applying a structural equation model to test the relevant hypotheses.

This article’s contents are structured as follows. Section 2 covers the relevant literature briefly and summarizes the gaps in the current literature. Section 3 provides theories on the connections between entrepreneurial cognition, knowledge search, and DBMI. The research design is stated in Section 4. Section 5 explains the procedures and outcomes

of the empirical analysis. The findings, theoretical contributions, practical implications, limitations, and future research are all discussed in Section 6.

## 2. Literature Review

### 2.1. Dual Business Model Innovation

Business model innovation (BMI) is a significant extension of Schumpeterian innovation theory that has been shown to improve firm performance [11]. Understanding business model innovation can be approached from four different perspectives: capacity perspective [12], technology perspective [13], values perspective [14], and strategic perspective [15]. Early scholars studied business model innovation as a unidimensional construct, but as the business environment has changed, so have the types of business model innovation. Business model innovation can be divided into proactive and reactive business model innovation based on the differences in driving objectives [6]. Companies that are restricted in resources and capabilities may adopt a single proactive or reactive business model innovation, but they may also adopt a balance strategy and maintain a strong focus on both innovation modes, which is known as dual business model innovation. As a consequence, dual business model innovation differs from traditional innovations such as technology and product innovation in that it is a systematic innovation that transforms all elements of business activities, representing a dynamic process of optimizing and reorganizing resources and reshaping value-added logic, which contains a series of proactive strategic layouts to consciously transform the external environment as well as partial tactical adjustments.

According to the existing literature, the antecedents of business model innovation are classified into two types: intrinsic factors and extrinsic factors [16]. Senior executives, as the initiators and designers of major decisions under the principal-agent corporate governance structure, are the intrinsic motivators that drive business model innovation. Recent works have investigated the relationship between executives' characteristics and business model innovation based on multiple levels. Executive personality, competence, behavior, and background are all individual level predictors, which focus on deep diversity of CEO. For example, Kiss et al. [17] suggested that executive proactive personality facilitated inter-organizational knowledge sharing and promoted business model innovation; Hu [18] and others claimed that The CEO's corporate social responsibility helped to legitimize the corporation and hence had a positive impact on business model innovation. On the other hand, TMT heterogeneity, team experience, behavioral integration, and team competency are team level determinants. For instance, Osiyevskyy and Dewald [19] discovered that TMT experience tended to limit decision-making flexibility and hamper business model novelty, whereas Guo et al. [20] empirically proved the "threshold effect" of TMT heterogeneity on business model innovation. Several studies have shown that both proactive and reactive business model innovation require TMT as the primary decision maker to integrate resources, reconfigure organizations, foresee technological paradigms, and generate profitable models, but the relationship between TMT cognitive style and business model innovation has received less attention [6].

### 2.2. Entrepreneurial Cognition

Entrepreneurial cognition stems from reflections on the usual traits of successful entrepreneurs and seeks to answer the question of "why entrepreneurs or start-ups can capitalize on possibilities to thrive". Mitchell [21] was the first to define entrepreneurial cognition as a knowledge framework composed of configuration cognition, willingness cognition, and ability cognition. This three-dimensional framework is stimulated in entrepreneurial settings as a cornerstone for individuals to examine, judge, and make decisions about external opportunities, risks, resources, business growth, and other pertinent information. Some researchers have provided alternate understandings of entrepreneurial cognition from other viewpoints, but Mitchell's theory better reflects the nature of cognition and is commonly accepted and utilized. Mitchell's three-dimensional structure was adopted by a

great number of subsequent empirical research, and it gradually became a separate field of research.

Early research on entrepreneurial cognition concentrated on entrepreneurs and entrepreneurial groups, emphasizing that entrepreneurial cognition is a simplified mindset formed by entrepreneurs based on their entrepreneurial experience, which assists entrepreneurs in identifying business opportunities, improving the quality of decision making for new products and services, and significantly contributing to the firm's profitability and dynamic capabilities [22]. As research has evolved, a considerable amount of data has arisen demonstrating that entrepreneurial cognition is not a mental model that exists only among entrepreneurs, but rather exists consistently across levels, cultures, and groups [23]. As a result, the primary focus of research in this subject has shifted from business creators to other organizational layer groups, with the TMT garnering special attention. For example, Yang [24] has discovered that entrepreneurial cognition may enable TMT to create distinct ideas, carry out foreseen adjustments, and capture commercial opportunities in an unclear context.

### 2.3. Review Summary

Existing research has set the theoretical groundwork for investigating the link between entrepreneurial cognition and business model creation, but there are major gaps. To begin with, scholars have mostly concentrated on entrepreneurs' entrepreneurial cognition, ignoring the impact of the top management team, which also serves as decision-makers, and TMT cognitive style on business model innovation. Second, conventional theories emphasize the differences between proactive and reactive business model innovations while ignoring their synergy and balance. As a result, most research focuses on the factors that influence single business model innovation, while less is known about the factors that influence dual business model innovation. Third, the processes of how entrepreneurial cognition of TMT promotes dual business model innovation are unknown, and explanations linked to their relationship are needed.

Given this, based on upper echelon theory, this study chooses TMT entrepreneurial cognition as a probable antecedent of dual business model innovation. Furthermore, dual business model innovation, as a highly creative and intelligent decision, is the consequence of executives' unique way of thinking being socialized, and the transformation of executive thinking to corporate decision making is necessary to search for knowledge and integrating it through the organization's internal and external social networks. Therefore, from the perspective of knowledge search, this research explains the process of entrepreneurial cognition acting on dual business model innovation.

## 3. Hypotheses Proposed

### 3.1. Entrepreneurial Cognition and Dual Business Model Innovation

Dual business model innovation is a combination of proactive and reactive strategy for dealing with uncertainty in an organization's evolutionary process, which is a reflection of the organization's dual innovation capabilities. Dual business model innovation differs from single business model innovation in that it has features such as balancing, dynamism, and synergy [25].

First feature is balancing, means setting a goal to strike a balance between two different business models. According to traditional innovation theory, distinct logical innovation behaviors demand various resources and cannot coexist in the same organization. In terms of business model innovation, adopting a proactive business model would restrict the organization's capacity to fulfill current market demands. If, conversely, a passive and reactive business strategy is utilized, the organization's future competitive advantage would be threatened. However, dual business model innovation encourages a harmonic style of thinking in which the two are not "either/or" and can be "reconciled" through appropriate resource and capacity allocation to achieve dual aims [26]. The second feature is dynamism. A single business model innovation implies a fixed assumption of future uncertainty. Reactive business model innovation assumes that future market and

technological uncertainty is low and that the organization only needs to iterate on the existing model, whereas proactive business model innovation presumes that future market and technological uncertainty is high and that the organization must make new changes to the profitability model [26]. The two types of innovations point to different strategic directions, and once identified, firms commit enormous resources, resulting in organizational rigidity and huge sunk costs. When confronted with discontinuous changes, such as “black swan” occurrences, customer preferences, or technical trajectories that do not progress in accordance with the original business logic, the organization will find itself in an innovation quandary. On the contrary, Dual business model innovation emphasizes various competitive advantages, improves responsiveness and organizational resilience through resource integration and coordination flexibility, decreases route dependency, and maintains a dynamic fit with the external environment [27]. The third feature is synergism. Single business model innovation stressing single-point breakthroughs, engaging particular departments, and limited synergistic effects inside the company are the two extremities of conventional innovative activities. As a result, the innovation process is confronted with “operational rigidity,” requiring it to overcome organizational processes, ideology, and other impediments. Dual business model innovation is more akin to the overall evolution of an enterprise organism, emphasizing both “forward” and “immediate” breakthroughs [28], and it necessitates stronger organizational capabilities, with each internal work unit linking and transforming knowledge, skills, and values to achieve both proactive and reactive business model innovation complementary and synergistic.

Dual business model innovation, as a distinct organizational behavior, is the consequence and mapping of top decision makers’ external environment cognition. According to the Upper Echelon Theory (UET), the heterogeneity of TMT, particularly variations in cognitive structure (knowledge competence structure), dictates organizational decision-making options and has an impact on the overall enterprise’s business success [29]. As a result, for the dual business model innovation drive to be successful, the executive team must have a mentality and cognitive structure that is consistent with the model’s attributes. According to studies, the management-oriented cognitive structure is one of bounded rationality cognition, in which managers make decisions via processing information from internal and external settings using an analytical processing system [30].

This cognitive structure emphasizes “how to do things better in a given direction” rather than “selecting the appropriate way to accomplish a breakthrough,” which is contrary to the features of dual business model innovation. Through an empirical comparison of multiple practitioners, Groves [31] discovers that entrepreneurial cognition is a more integrated and balanced mode of thinking, including both heuristic processing characterized by intuition and rational analytical processing, the type of processing triggered depending on the external situation and business demands. Heuristic processing kicks in when faced with high ambiguity and challenging scenarios. It assists leaders in identifying opportunities, making speedier decisions, drawing forward-thinking conclusions and directions, and contributing to the formation of proactive business model innovation. When faced with low uncertainty and predictable settings, analytical processing is triggered. It improves executive rigor and sensitivity to new evidence by converting fresh ideas into business possibilities via rigorous review and comprehensive planning, hence contributing to the establishment of reactive business model innovation.

Entrepreneurial cognition, on the other hand, encompasses configuration cognition, willingness cognition, and ability cognition, which have a strong fit with the three features of dual business model innovation [24].

To begin, configuration cognition is an individual knowledge structure about resource allocation that motivates corporate executives to actively build local and hyper-local networks to provide sufficient resources for future technological paradigms and brand-new business models; at the same time, it provides imitation isolation mechanisms for core resources through conceptual protection, forms innovation barriers, and weakens potential resource conflicts between proactive and reactive resource allocation [32]. Second, will-

ingness cognition is an individual's knowledge structure concerning risks and benefits, which would improve executives' risk-taking and challenge awareness, and they will be more inclined to create potential business opportunities and break the established pattern rather than conservatively follow up. When external changes occur, TMT with high willingness cognition can take response measures very quickly to enhance and improve the company's products and services, meeting the dynamic business requirement [33]. Finally, ability cognition is an individual's knowledge structure about understanding and cognitive situations, which can motivate executives to broaden and deepen their industry cognition from experience, drive them to evaluate the conditions and possibilities for the realization of each decision, and identify the most appropriate strategy implementation, fulfill the requirements of the strategy [34].

In combination with the above analysis, the following hypotheses are proposed in this study.

H1: Entrepreneurial cognition of TMT positively affects proactive business model innovation (H1a: configuration cognition positively and significantly affects proactive business model innovation; H1b: willingness cognition positively and significantly affects proactive business model innovation; H1c: ability cognition positively and significantly affects proactive business model innovation).

H2: Entrepreneurial cognition of TMT positively influences reactive business model innovation (H2a: configuration cognition positively and significantly influences reactive business model innovation; H2b: willingness cognition positively and significantly influences reactive business model innovation; H2c: ability cognition positively and significantly influences reactive business model innovation).

### 3.2. The Mediating Role of Knowledge Search

Knowledge search, also known as innovation search, is a search activity for information and knowledge related to new technologies, new products, new processes, and new business opportunities carried out by enterprises with the goal of solving enterprise development problems and adapting to the external environment through knowledge reorganization or creation [35]. According to organizational learning theory, knowledge search is a common organizational learning behavior, which can be separated into exploratory knowledge search and exploitative knowledge search. Exploratory knowledge search is horizontal domain-oriented learning based on current knowledge, whereas exploitative knowledge search is a cross-border learning behavior that breaks organizational inertia and knowledge base [36]. Both behaviors have advantages and disadvantages. Exploitative knowledge search can strengthen the enterprise's expertise in current domains with little search cost and risk, but the acquired knowledge is not broad enough, and the competitive advantage thus formed is easily imitated and eroded. Exploratory knowledge search can enhance the enterprise's differentiation, but it requires a large amount of organizational resources, and the risk and cost are relatively high [37].

According to research on the antecedents of knowledge search, top executives tend to select distinct modes of knowledge search depending on their cognitive style, which interprets organizational resources and environmental uncertainty [38]. When executives' cognitive styles approach bounded rational cognition, systematic logical thinking activates, resulting in exceptionally high-risk alertness and a preference for exploitative information seeking. Similarly, as executives' cognitive styles approach intuitive cognition, enlightened thinking is turned on, resulting in a high-risk appetite and emotional orientation, which drives executives to prefer exploratory knowledge search [30].

In comparison to the previous two cognitive models, entrepreneurial cognition is a more comprehensive and dynamic organic system comprising willingness cognition, configuration cognition, and ability cognition. Among them, willingness cognition emphasizes business opportunity creation, which is at the heart of entrepreneurial cognition and is the objective function of all external information processing; whereas configuration cognition and ability cognition concentrate on resource allocation and capability matching, which are the

two cornerstones of entrepreneurial cognition. These three dimensions of entrepreneurial cognition are intertwined, providing a tight logical closure. Accordingly, when executives adopt entrepreneurial cognition, they no longer assess external information just from the standpoint of risk and reward, but instead make systematic decisions based on three factors including business opportunity generation, resource allocation, and capacity matching. At this point, the cognitive process is no longer a single information processing, but rather a dual information processing that dynamically chooses whether to initiate “logical” or “intuitive” analysis regarding the degree of uncertainty of external information, leading to high exploitative search and a high exploration search in the organization’s knowledge search. In addition, entrepreneurial cognition represents a stronger cognitive ability which can enhance the self-efficacy and psychological capital of top managers in decision making and generate distinct motivations for knowledge search [39].

Strategic cognition theory states that executive cognitive style contains specific strategic orientations and goals that also have a guiding effect on origination behavior and outcome, such as knowledge search [40]. The three components of entrepreneurial cognition, configuration cognition, willingness cognition, and ability cognition imply networked, centralized, and highly innovative organizational goal setting. These goals stimulate the cognitive needs of top managers and guide them to think more deeply about decision options, attempt to establish unconscious connections between their attitudes and goals, and finally driving them to adopt high-exploitation search versus highly exploratory search to search for more and richer information before making judgments whenever possible. In summary, entrepreneurial cognition has a positive impact on both exploitative and knowledge search and exploratory knowledge search.

Knowledge search, according to innovation search theory, can increase knowledge stock, promote knowledge integration and new knowledge creation, and effectively solve enterprise innovation problems [41]. It is also an innovation activity for dual business model innovation, and organizations must accumulate sufficient and rich knowledge resources to drive their own changes and reinvent value-added logic and profit models. Therefore, it is guessed that the two types of knowledge search may have an impact on dual business model innovation. Specifically, exploratory knowledge search is a process in which organizations continuously draw nutrients from the open environment, bringing information and data with different attributes, contents, and forms to enterprises, which go beyond the existing competitive boundaries of organizations and present non-redundancy and high complementarity [42]. The fusion of this heterogeneous knowledge with the organization’s own knowledge results in innovative knowledge combinations that help enterprises generate new solutions in product and service development, process flow optimization, and profit model adjustment, respond to external environmental changes in a timely manner, and promote reactive business model innovation. Exploratory knowledge search contains successful examples of many advanced companies in other industries, providing enterprises with new logic, new models, and new perspectives to learn, refer to, and emulate, helping to broaden the organization’s horizon and promote the cultivation of a proactive mindset. Simultaneously, exploratory search increases the completeness and systematization of the knowledge base and improves the organization’s environmental scanning capability, allowing it to more accurately predict external markets as well as technological trends, which supports proactive business model innovation and drives breakthrough changes in the enterprise’s market structure and value-added logic [43].

On the other hand, exploitative knowledge search is the organization’s “deep plowing” of core domain knowledge, which can increase the enterprise’s knowledge stock and knowledge depth in this area and construct an integrated and structured knowledge structure about a specific subject. According to the knowledge foundation viewpoint, an organization’s standardized and mature knowledge structure is an important aspect of knowledge assets, including leading knowledge and innovative knowledge [44]. Leading knowledge has a high value and scarcity, and it represents the organization’s competitive advantage in the industry, which is expressed in differentiated products and services.

The leading knowledge obtained through exploitative search can improve the company's awareness and understanding of its customers' and stakeholders' needs, enable it to accurately grasp the market's dynamic changes, adjust the key aspects of the business model, make "targeted" innovation, and promote reactive business model innovation [45]. Innovation knowledge, which is difficult to copy but extremely valuable to develop, is the key to an organization's superiority over competitors and is expressed by innovation barriers. Innovative knowledge gained through exploitative search helps firms to change the industry's regulations, resulting in qualitative improvements in products and services and supporting proactive business model innovation [46]. Furthermore, domain-specific knowledge frameworks based on exploratory knowledge search exploitative knowledge search can distinguish effective knowledge from ineffective knowledge, prevent organizations from processing similar knowledge twice, reduce internal knowledge governance costs, and promote the transformation of leading knowledge and innovative knowledge into dual business model innovation.

In combination with the above analysis, the following hypotheses are proposed in this study.

H3: Exploratory knowledge search plays a mediating role between entrepreneurial cognition of TMT and dual business model innovation by the following mechanisms: exploratory knowledge search has a mediating role between configuration cognition (H3a), willingness cognition (H3b), ability cognition (H3c) of TMT and proactive business model innovation; exploratory search has a mediating role between configuration cognition (H3d), willingness cognition (H3e), and ability cognition (H3f) of TMT and reactive business model innovation.

H4: Exploitative knowledge search plays a mediating role between entrepreneurial cognition of TMT and dual business model innovation. The specific mechanisms of action are as follows: exploitative knowledge search has a mediating role between the configuration cognition (H4a), willingness cognition (H4b), and ability cognition (H4c) of TMT and proactive business model innovation; exploitative knowledge search has a mediating role between the configuration cognition (H4d), willingness cognition (H4e), and ability cognition (H4f) of TMT and reactive business model innovation.

### 3.3. Integrating Conceptual Models

Integrating the research hypotheses H1–H4, the conceptual model of "entrepreneurial cognition of TMT knowledge search—dual business model innovation" is shown in Figure 1. Among them, entrepreneurial cognition is the antecedent variable, including three dimensions of configuration cognition, willingness cognition and ability cognition; knowledge search is an organizational learning pattern, including two dimensions of exploratory knowledge search and exploitative knowledge search; dual business model innovation is the outcome variable, which is a dynamic system, including proactive and reactive business model innovation. The integrated model illustrates the mechanism of action among the three from the dimensional level.

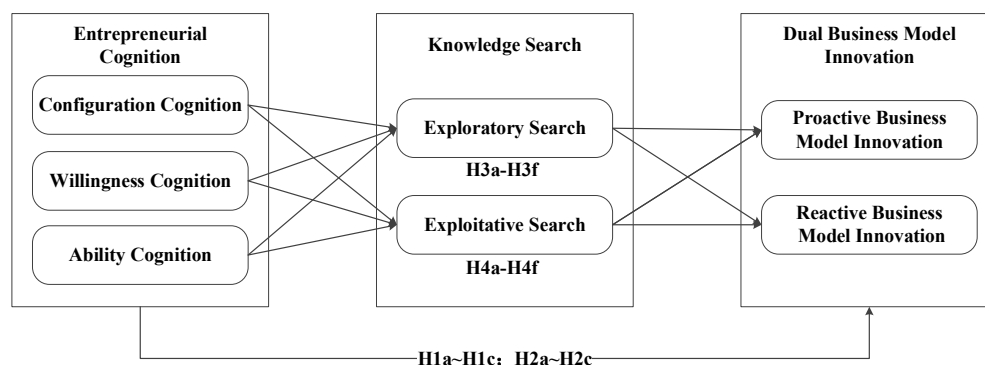


Figure 1. Theoretical Model.

## 4. Research Design

### 4.1. Procedures and Samples

The data for this study were obtained based on the “Entrepreneurial Cognition and Dual Business Model Innovation” questionnaire. The questionnaire includes basic information about the respondents and three scales of entrepreneurial cognition, knowledge search, and dual business model innovation. In order to ensure reliable and accurate data, the measurement instruments were adopted from existing established scales, and the word of the questions was revised by experts in the field and two corporate executives to improve the comprehensibility of the measurement questions.

The conceptual model of this study involves organizational level behaviors such as entrepreneurial cognition of TMT, knowledge search and business model. The corporate decision makers, such as president, general manager and director, knows the most of this information, so they are chosen as the target group of the research. The formal questionnaire was combined with online and field survey, and the survey process made full use of the social resources such as MBA students and past project partners, who contacted the senior leaders of their firms, and then chose the research method flexibly according to the time schedule of the respondents after obtaining their consent.

Written informed consent to participate in this study was provided by the participants, and participants were assured of data confidentiality, and it was explained that only the authorized researchers could access the data. This study was conducted in compliance with the Helsinki Declaration and was reviewed and approved by the Ethics Committee of Institute of Disaster Prevention. A total of 357 questionnaires were sent out and 272 were collected, with a return rate of 76.190%. 53 invalid questionnaires were excluded such as randomly filled out or all answers were similar, and the final valid questionnaires were 219, with an efficiency rate of 80.515%.

The mean group size of TMTs surveyed was 7.293, and 83% of the group members were male, with the average age of 41.05 years and the job tenure of 6.552 years. The mean organizational size of surveyed firms was 616.403 employees, and 66.21% of them had been established for more than 10 years. All firms were located throughout China, the governance structure of which were state-owned/state-controlled (13.242%), Chinese private owned (65.753%), joint ventures (14.155%), and wholly foreign-owned (6.849%). The main industry fields represented included retail service (42.922%), manufacturing (31.050%), information technology (15.525%), and finance service (10.520%).

### 4.2. Variable Measurement

(1) Entrepreneurial cognition. Entrepreneurial cognition represents the knowledge structure possessed by the executive team, using Mitchell’s three-dimensional structure, including configuration cognition (EC1), willingness cognition (EC2), and ability cognition (EC3). Among them, entrepreneurial configuration cognition is measured in terms of conceptual protection, network building, and resource possession; willingness cognition is measured in terms of opportunity capture, commitment limits, and opportunity trade-offs; and competence cognition is measured in terms of competence-opportunity matching, diagnostic ability, and contextual knowledge. The question items refer to the measurement scales of Smith [47], Yang-Lin [24], and others, which are consistent with Mitchell’s three-dimensional structure.

(2) Dual business model innovation. The dual business model innovation consists of the proactive business model innovation (BMI1) and the reactive business model innovation (BMI2), and the measurement questions are modified by referring to the research scale of Luo [48].

(3) Knowledge search. The knowledge search included the exploitative search (KS2) and the exploratory search (KS1), and the questions were set according to the relevant studies by He and Fei [49].

All of the above variables were measured using a five-point scale for Lippincott, where “1–5” represents “strongly disagree—strongly agree”, and the related scales and corresponding questions are shown in Table 1.

**Table 1.** Measuring Items of Variables.

Variable		Number and Title
Entrepreneurial Cognition	Configuration Cognition (EC1)	q1. TMT tends to offer products or services to the market that have a technological advantage or are protected by patents.
		q2. TMT focuses on building and maintaining trusting relationships with our partners.
		q3. TMT has certain assets, contacts and expertise that are scarce in this industry.
	Willingness Cognition (EC2)	q4. TMT is more process-oriented rather than results-oriented when looking for opportunities.
		q5. TMT prefers to take risks and experiment rather than waste time on judging opportunities.
		q6. TMT looks beyond the current gains and losses to the long term when earnings do not meet expectations.
	Ability Cognition (EC3)	q7. TMT tends to think rationally and come up with multiple alternatives when dealing with problems, rather than relying on instinct.
		q8. TMT is able to allocate people, money and materials appropriately in the face of new investment decisions.
		q9. TMT responds to changes in the external environment through a pool of expertise rather than “relying on the sky”.
Dual Business Model Innovation	Proactive Business Model Innovation (BMI1)	y1. The company in which we work identify new opportunities and develop new markets in an out-of-the-box way.
		y2. The company leads a novel trading mechanism and establishes new operational processes, practices and norms.
		y3. The company plays a central role in the stakeholder business ecosystem.
		y4. The company has obtained more new ideas, inventions and patents through its business model.
	Reactive Business Model Innovation (BMI2)	y5. The company is constantly improving its main products and services to meet customer needs.
		y6. The company continuously optimizes existing processes, knowledge and technology, and values the satisfaction of our trading partners.
		y7. The company strives to integrate into existing external innovation cooperation networks.
		y8. The company tends to follow the market leader in innovation.
Knowledge Search	Exploratory Search (KS1)	k1. The company in which we work place emphasis on gathering cutting-edge information on technology and science.
		k2. The company values the progress of discovering forward-looking information and knowledge from the outside.
		k3. The company focuses on new knowledge in the market outside of our main business areas.
		k4. The company places emphasis on absorbing new knowledge from outside the organization.

Table 1. Cont.

Variable	Number and Title
Exploitative Search (KS2)	k5. The company values the storage of existing knowledge.
	k6. The company can discover similar information or knowledge from outside.
	k7. The company is able to search for new knowledge related to your main business.
	k8. The company is concerned about the state of technology development in this field and related industry information.
	k9. The company is constantly absorbing new knowledge that will help improve current products.

(4) Control variables. Relevant studies point out that there are some disparities in business model innovation strategy selection across firms of various ages, sizes, and ownership types [50]. To avoid bias, this article treats enterprise age, enterprise size, and ownership type as control variables which is calculated through natural logarithms. Among them, enterprise age is the number of years since the establishment of the firm until the end of 2020. In this paper, it is divided into four intervals: 1–5 years, 6–10 years, 11–15 years, and more than 15 years, and expressed by categorical variables. Enterprise size is divided into seven different intervals according to the total number of employees, which are represented by categorical variables. Ownership type is divided into 4 categories: state owned or controlled enterprises, privately held enterprises, wholly foreign-owned/joint ventures, other ventures, and expressed by categorical variables.

#### 4.3. Reliability and Validity Tests

The internal consistency Cronbach's  $\alpha$  value ( $\alpha$  value) and the combined reliability (CR) were used for the reliability test, and the results are shown in Table 2. The internal consistency coefficients of the variables ranged from 0.718 to 0.830, all of which were greater than 0.700; the CR values ranged from 0.809 to 0.866, all of which were greater than the basic requirement value of 0.700, and the results of both parts indicate that the measured variables have good reliability.

Table 2. Results of Reliability and Validity Analysis.

Variable		Items	Factor Loading	$\alpha$ Value	AVE	CR	Goodness of Fit
Entrepreneurial Cognition	EC1	q1	0.835	0.718	0.599	0.815	$\chi^2_{df} = 1.017$ RMSEA = 0.009 GFI = 0.975 CFI = 0.999 TLI = 0.999
		q2	0.826				
		q3	0.645				
	EC2	q4	0.773	0.742	0.615	0.827	
		q5	0.788				
		q6	0.791				
	EC3	q7	0.856	0.823	0.683	0.866	
		q8	0.785				
		q9	0.837				
Dual Business Model Innovation	BMI1	y1	0.701	0.725	0.515	0.809	$\chi^2_{df} = 1.029$ RMSEA = 0.012 GFI = 0.980 CFI = 0.999 TLI = 0.998
		y2	0.633				
		y3	0.754				
		y4	0.774				
	BMI2	y5	0.696	0.744	0.533	0.820	
		y6	0.752				
		y7	0.762				
		y8	0.709				

Table 2. Cont.

Variable	Items	Factor Loading	$\alpha$ Value	AVE	CR	Goodness of Fit	
Knowledge Search	KS1	k1	0.692	0.572	0.842	$\chi^2_{df} = 1.293$ $RMSEA = 0.037$ $GFI = 0.967$ $CFI = 0.989$ $TLI = 0.985$	
		k2	0.794				
		k3	0.824				
		k4	0.708				
	KS2	k5	0.645	0.830	0.558		0.862
		k6	0.798				
		k7	0.753				
		k8	0.781				
		k9	0.747				

The validity tests are composed of content validity test, structural validity test, convergent validity test and discriminant validity test, the results of which are shown in Tables 2 and 3.

Table 3. Results of Discriminant Validity Analysis.

Model	$\chi^2$	df	TLI	CFI	SRMR	RMSEA(90% CI)
Seven-factor Model: EC1,EC2,EC3,KS1,KS2,BMI1,BMI2	558.617	413	0.932	0.940	0.052	0.040 (0.031,0.048)
Six-factor Model: EC1 + EC2, EC3, KS1,KS2,BMI1,BMI2	661.304	419	0.889	0.900	0.057	0.051 (0.044,0.059)
Five-factor Model: EC1 + EC2 + EC3, KS1, KS2, BMI1, BMI2	708.192	424	0.871	0.882	0.058	0.055 (0.048,0.062)
Four-factor Model: EC1 + EC2 + EC3 + KS1, KS2, BMI1, BMI2	767.838	428	0.847	0.859	0.061	0.060 (0.053,0.067)
Three-factor Model: EC1 + EC2 + EC3 + KS1 + KS2, BMI1, BMI2	833.669	431	0.820	0.833	0.068	0.065 (0.059,0.072)
Two-factor Model: EC1 + EC2 + EC3 + KS1 + KS2 + BMI1, BMI2	927.115	433	0.780	0.795	0.066	0.072 (0.066,0.079)
One-factor Model: EC1 + EC2 + EC3 + KS1 + KS2 + BMI1 + BMI2	1112.026	434	0.699	0.719	0.078	0.084 (0.078,0.091)

First, all the scales were based on existing mature measurement tools, and the content of the items were revised by experts and typical subjects to ensure reliable content validity.

Second, exploratory and confirmatory factor analysis were used to assess structural validity. An exploratory factor analysis was performed using SPSS 22.0 through the principal component rotation method, and the KMO values of entrepreneurial cognition, knowledge search, and dual business model innovation were 0.814, 0.828, and 0.816, respectively, which were all greater than 0.800, with the cumulative explained variance of all three variables higher than 50%, indicating the existence of internal structure. In addition, first-order confirmatory factor analysis was conducted using AMOS22.0, and the goodness-of-fit of the structural models of each latent variable exceeded the basic requirements ( $\chi^2/df < 5.000$ ; TLI > 0.900; CFI > 0.900; GFI > 0.900; RMSEA < 0.008), which can be seen that the variables have good structural validity.

Third, convergent validity was judged by factor loadings, combined reliability and average variance extracted (AVE) (all should be greater than 0.500). The results showed that all the standardized factor loadings were higher than 0.700 and the CR values were higher than 0.800, which reached the significant level. The AVE values were all higher than 0.500, so the convergent validity of the scales was considered to be good.

Fourth, discriminant validity was tested by comparing the Random nested models. On the basis of the single-factor model, six nested models were established, as shown in Table 3, it can be seen that the indicators of the seven-factor model reached the ideal state and fit better than the other six nested models, indicating that each variable measure has good discriminant validity.

#### 4.4. Common Method Deviation Test

The data in this paper are self-reported by top corporate decision makers and may suffer from common method bias. In this regard, reference to Podsakoff's [51] study, Harman's one-way test was conducted. Unrotated principal component analysis of all variable measurement question items yielded a total of seven factors, of which the unrotated contribution of the first factor was 24.623%, and the contribution of this factor in explaining variance was less than 40%, indicating that there was no serious common method bias.

### 5. Hypotheses Test

#### 5.1. Correlation Analysis

Correlation analysis was performed on the variables and the results are shown in Table 4. The results show that there are significant correlations among the dimensions of entrepreneurial cognition, knowledge search, and dual business model innovation, and the correlation coefficients are all less than 0.700, indicating that there is no multicollinearity among the variables, which is suitable for further investigation of the causal relationship through structural equation model.

**Table 4.** Mean, Standard Deviation and Correlation Coefficient.

Variable	Mean Value	Standard Deviation	EC1	EC2	EC3	KS1	KS2	BMI1	BMI2
EC1	3.950	0.621	1						
EC2	3.977	0.537	0.334 **	1					
EC3	3.944	0.647	0.386 **	0.447 **	1				
KS1	3.998	0.456	0.367 **	0.427 **	0.439 **	1			
KS2	3.954	0.516	0.438 **	0.496 **	0.507 **	0.494 **	1		
BMI1	3.904	0.504	0.487 **	0.490 **	0.468 **	0.598 **	0.574 **	1	
BMI2	4.067	0.480	0.424 **	0.458 **	0.445 **	0.555 **	0.560 **	0.465 **	1

Note: \*\* indicates significance level  $p < 0.01$  (two-tailed test).

#### 5.2. Direct Effect

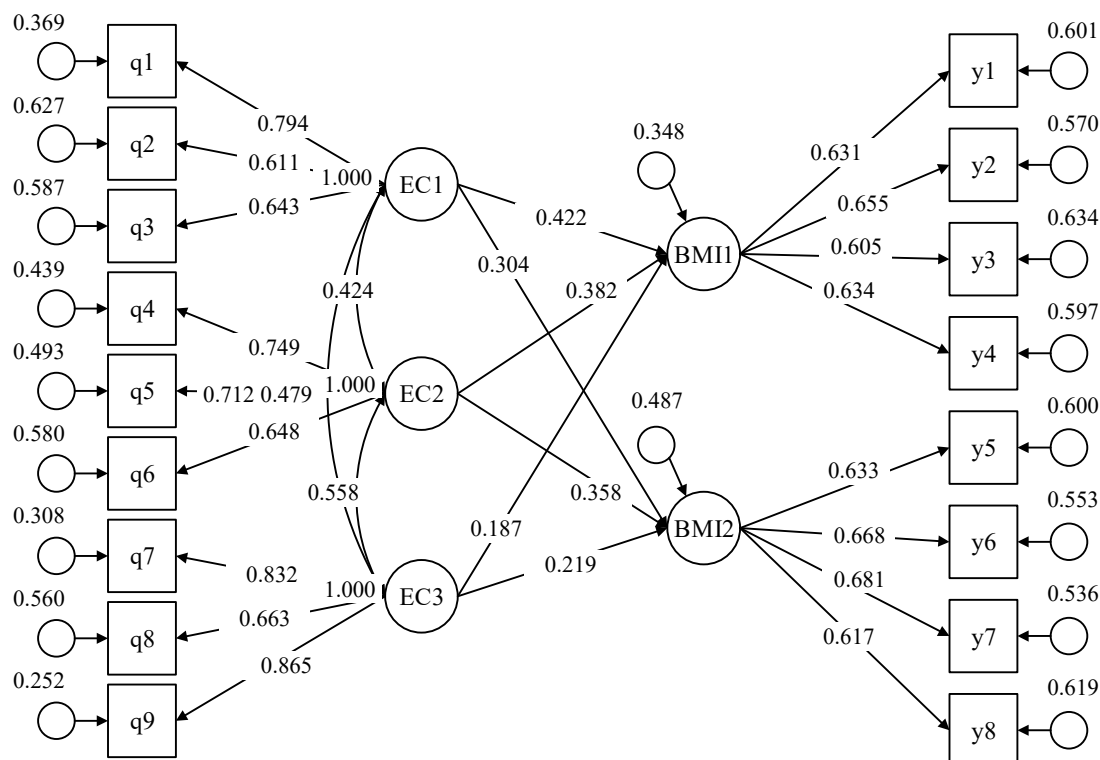
A structural equation model was applied with Mplus7.0 to validate the direct association between entrepreneurial cognition and dual business model innovation, and the outcomes are presented in Figure 2. Table 5 illustrates the goodness of fit for the direct effect model, which demonstrates that the model fits well. Table 5 also shows the coefficients and significance test findings for the routes of the direct effect model.

**Table 5.** Path Coefficient and Fitting Index for Direct Effect Model.

Regression Path	Standardized Path Coefficient	Significance $p$ -Value	Assumptions Are Validated or Not
Proactive Business Model Innovation← Configuration Cognition	0.422	0.000 (<0.001)	H1a is adopted
Proactive Business Model Innovation← Willingness Cognition	0.382	0.000 (<0.001)	H1b is adopted
Proactive Business Model Innovation← Ability Cognition	0.187	0.036 (<0.050)	H1c is adopted
Reactive Business Model Innovation← Configuration Cognition	0.304	0.001 (<0.010)	H2a is adopted
Reactive Business Model Innovation← Willingness Cognition	0.358	0.000 (<0.001)	H2b is adopted

Table 5. Cont.

Regression Path	Standardized Path Coefficient	Significance <i>p</i> -Value	Assumptions Are Validated or Not
Reactive Business Model Innovation ← Ability Cognition	0.219	0.025 (<0.050)	H2c is adopted
Overall model fitting index	$\chi^2 = 111.400$ , $df = 109.000$ , $\chi^2/df = 1.022$ , $TLI = 0.997$ , $CFI = 0.998$ , $SRMR = 0.042$ , $RMSEA = 0.010$		



**Figure 2.** SEM for the Direct Relationship between Entrepreneur Cognition and Dual Business Model Innovation.

As shown in Table 5, configuration cognition ( $\beta = 0.422$ ,  $p < 0.001$ ), willingness cognition ( $\beta = 0.382$ ,  $p < 0.001$ ), ability cognition ( $\beta = 0.187$ ,  $p < 0.050$ ) is positively associated with proactive business model innovation, confirming hypothesis H1a, H1b, H1c. The configuration cognition ( $\beta = 0.304$ ,  $p < 0.010$ ), willingness cognition ( $\beta = 0.358$ ,  $p < 0.001$ ), ability cognition ( $\beta = 0.219$ ,  $p < 0.050$ ) is positively associated with reactive business model innovation, confirming hypothesis H2a, H2b, H2b. In conclusion, all of the path coefficients are significant at the level of  $p < 0.050$ , indicating that the high level of TMT entrepreneurial cognition could increase dual business model innovation.

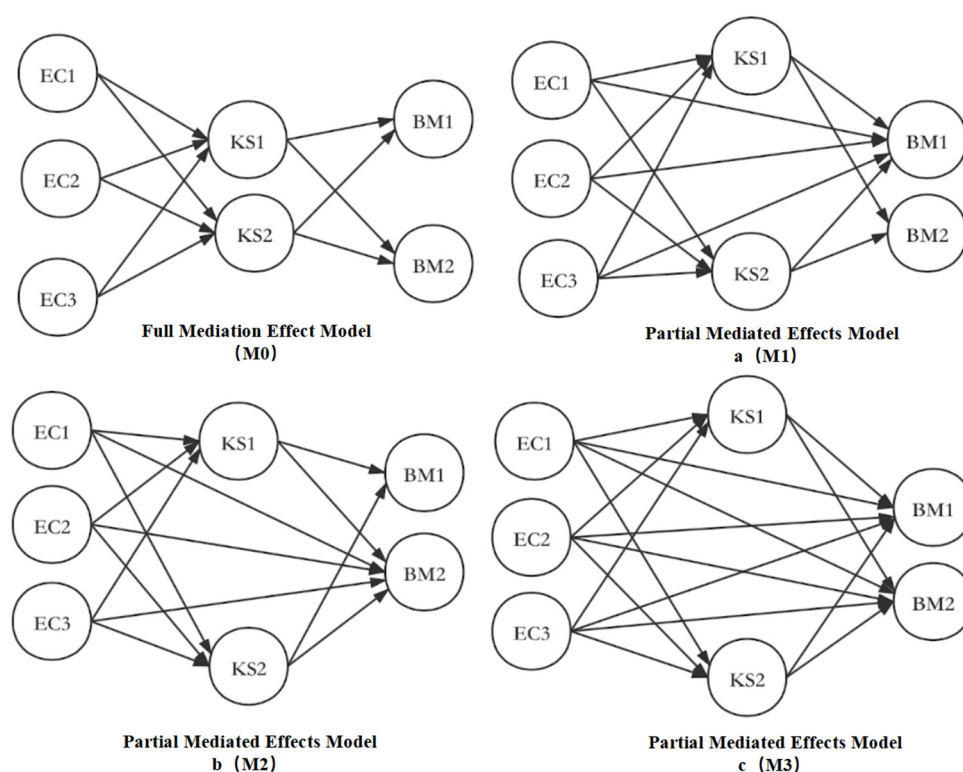
### 5.3. Comparison of Structural Equation Models for Mediating Effects

The theoretical model established is a multivariate and multiple mediation model, with the dependent, mediating, and outcome variables all being latent variables. According to the study of Liu and Ling [52], the examination of such a model can be conducted by structural equation model. The nested model comparison approach is utilized to identify the best-fit model, and then the mediating effect of the knowledge search is examined [53].

This research hypothesizes that knowledge search plays a mediating role between entrepreneurial cognition of TMT and dual business model innovation. This mediating effect, on the other hand, might be either full or partial. To demonstrate the existence of

such a mediating effect and to expose the path of the mediating effect more clearly, this study uses the full mediation effect model (M0) as the benchmark and develops three other nested models (partial mediation effect model a, M1; partial mediation effect model b, M2, and partial mediation effect model c, M3).

The fully mediation effect model (M0) states that entrepreneurial cognition affects dual business model innovation exclusively through two types of knowledge search. The partial mediation effect model a (M1) is based on model M0 by adding the direct paths of configuration cognition, willingness cognition, and ability cognition on proactive business model innovation; the partial mediation effect model b (M2) is based on model M0 by the direct paths of configuration cognition, willingness cognition, and ability cognition on reactive business model innovation; the partial mediation effect model c (M3) is based on model M0 by adding the direct paths of configuration cognition, willingness cognition, and ability cognition on both proactive business model innovation and reactive business model innovation. The schematic diagram of the four models is shown in Figure 3.



**Figure 3.** Benchmark Model and Three Nested Models.

The fit indices of the benchmark model and three other nested models obtained using structural equation modeling are shown in Table 6.

**Table 6.** Comparison for Nested Models.

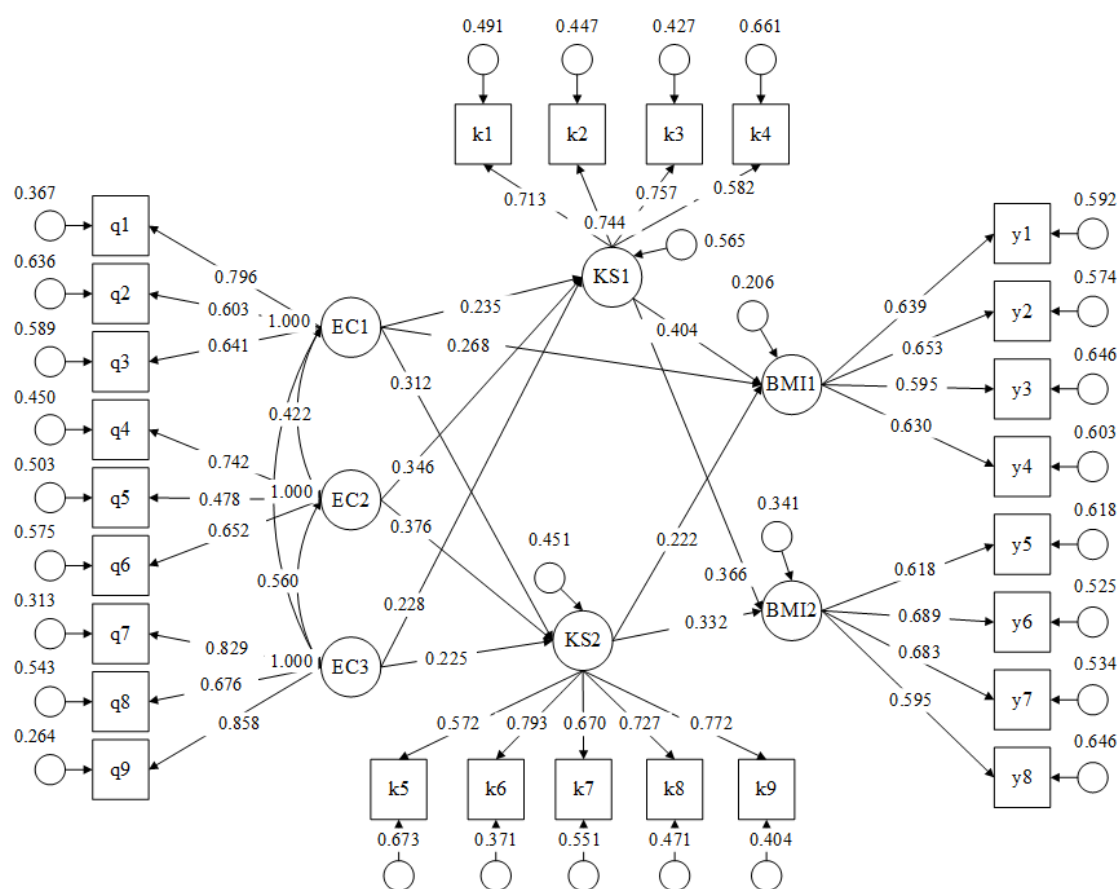
Model	$\chi^2$	df	$\chi^2/df$	RMSEA	SRMR	TLI	CFI
M <sub>0</sub>	327.175	285	1.148	0.026	0.046	0.977	0.980
M <sub>1</sub>	315.487	282	1.119	0.023	0.047	0.982	0.984
M <sub>2</sub>	323.580	282	1.147	0.026	0.046	0.977	0.980
M <sub>3</sub>	311.832	279	1.118	0.023	0.047	0.982	0.984

Models M0~M3 all have good fitness, and comparing the fit indices reveals that model M2 outperforms model M0, model M1 outperforms model M2, and model M3 outperforms model M1. In conclusion, model M3 is the best model, demonstrating that exploratory and

exploitative search mediate the association between entrepreneurial cognition of TMT and dual business model innovation. Thus, model M3 is applied for a more detailed mediation effect study.

#### 5.4. Analysis of Mediating Effects

The nested model comparison indicated that the mediating effect model M3 had the best fitting, hence model M3 was adopted for the mediating effect study. Figure 4 depicts the structural equation model of M3, with the solid line indicating the significant paths and the insignificant paths hidden. Table 7 represents the path coefficients and significance tests for the impacts of configuration cognition, willingness cognition, and ability cognition on dual business model innovation in model M3.



**Figure 4.** SEM for the Relationship among Entrepreneur Cognition, Knowledge Search and Dual Business Model Innovation.

**Table 7.** Path Coefficient and Significance Test of the Best Fit Mediation Effect Model.

Regression Path	Standardized Path Coefficient	Significance <i>p</i> -Value
Exploratory Search← Configuration Cognition	0.235	0.010 (<0.050)
Exploratory Search← Willingness Cognition	0.346	0.000 (<0.001)
Exploratory Search← Ability Cognition	0.228	0.021 (<0.050)
Exploitative Search← Configuration Cognition	0.312	0.000 (<0.001)
Exploitative Search← Willingness Cognition	0.376	0.000 (<0.001)
Exploitative Search← Ability Cognition	0.225	0.012 (<0.050)
Proactive Business Model Innovation← Exploratory Search	0.404	0.000 (<0.001)
Proactive Business Model Innovation← Exploitative Search	0.222	0.035 (<0.050)

Table 7. Cont.

Regression Path	Standardized Path Coefficient	Significance <i>p</i> -Value
Reactive Business Model Innovation← Exploratory Search	0.366	0.000 (<0.001)
Reactive Business Model Innovation← Exploitative Search	0.332	0.003 (<0.010)
Proactive Business Model Innovation← Configuration Cognition	0.268	0.003 (<0.010)
Proactive Business Model Innovation← Willingness Cognition	0.178	0.084 (>0.050)
Proactive Business Model Innovation← Ability Cognition	0.036	0.684 (>0.050)
Reactive Business Model Innovation← Configuration Cognition	0.126	0.187 (>0.050)
Reactive Business Model Innovation← Willingness Cognition	0.123	0.262 (<0.050)
Reactive Business Model Innovation← Ability Cognition	0.050	0.594 (>0.050)
Model Goodness of Fit: $\chi^2_{df} = 1.110$ , $TLI = 0.982$ , $CFI = 0.984$ , $SRMR = 0.047$ , $RMSEA = 0.023$		

According to Wen [54], the following conclusions on the mediating effect could be drawn from by comparing the direct and indirect impact correlation coefficients. In contrast to Figure 3, the direct connections between entrepreneurial cognition and business model innovation are insignificant in Figure 4, except the direct link between EC1 and BMI1, showing that knowledge search has a different mediating effect on the conjunctions.

Regarding the exploratory knowledge search, paths from EC1 ( $\beta = 0.235$ ), KS1 ( $\beta = 0.404$ ) to BMI1 are all positive and significant, with a significant direct association between EC1 and BMI1, indicating that KS1 plays a partly mediating influence between EC1 and BMI1, supporting H3a. While paths from EC1 ( $\beta = 0.235$ ), KS1 ( $\beta = 0.366$ ) to BMI2 are all positive and significant, there is no direct effect of EC1 on BMI2, suggesting that KS1 plays a fully mediating effect between EC1 and BMI2, supporting H3d. Moreover, paths from EC2 ( $\beta = 0.346$ ), KS1 ( $\beta = 0.404$ ) to BMI1, from EC2 ( $\beta = 0.346$ ), KS1 ( $\beta = 0.366$ ) to BMI2, from EC3 ( $\beta = 0.228$ ), KS1 ( $\beta = 0.404$ ) to BMI1, and paths from EC3 ( $\beta = 0.228$ ), KS1 ( $\beta = 0.366$ ) to BMI2, are all positive and significant, with no direct links, suggesting that the relationship between EC2 and dual business innovation, as well as EC3 and dual business innovation, is fully mediated by KS1, supporting H3b, H3e, H3c, H3f. Overall, it can be concluded that KS1 has a mediating effect on the relationship between entrepreneurial cognition and dual business model innovation, supporting H3.

Regarding the exploitative knowledge search, the paths from EC1 ( $\beta = 0.312$ ), KS2 ( $\beta = 0.222$ ) to BMI1 are all positive and significant, with the direct link between EC1 and BMI1, which indicates that the relationship between EC1 and BMI1 is partially mediated by KS2, supporting H4a. While paths from EC1 ( $\beta = 0.312$ ), KS2 ( $\beta = 0.332$ ) to BMI2 are all significant, there is no direct link, suggesting a fully mediating role of KS2 in the effect of EC1 on BMI2, supporting H4d. Moreover, paths from EC2 ( $\beta = 0.376$ ), KS2 ( $\beta = 0.222$ ) to BMI1, from EC2 ( $\beta = 0.376$ ), KS2 ( $\beta = 0.332$ ), to BMI2, from EC3 ( $\beta = 0.225$ ), KS2 ( $\beta = 0.222$ ) to BMI1 and paths from EC3 ( $\beta = 0.225$ ), KS2 ( $\beta = 0.332$ ) to BMI2, are all significant, with none direct route, suggesting that the relationship between EC2 and dual business innovation, as well as EC3 and dual business innovation, is fully mediated by KS2, supporting H4b, H4e, H4c, H4f. Overall, it can be concluded that KS2 has a mediating effect on the relationship between entrepreneurial cognition and dual business model innovation, supporting H4.

## 6. Results and Discussion

### 6.1. Conclusions

To answer the key question of how companies can survive and turn crisis into opportunity through business model innovation in such an unpredictable VUCA (Volatile, Uncertain, Complex, Ambiguous) world, this paper investigated the impact of the entrepreneurial cognition of TMT on dual business model innovation via the mediating role

of knowledge searching. Based on the hypotheses examined by the SEM method, the following conclusions were obtained.

First, our results reveal that entrepreneurial cognition has a positive effect on DBMI. This finding indicates that the entrepreneurial cognition of TMT is a critical precondition for dual business model innovation, which can process external information both analytically and heuristically, allowing top managers to consider the dynamics, balance, and synergy of decision making. Thus, firms can increase the entrepreneurial cognition of TMT to advance their duality of business model innovation.

Second, our results demonstrate that entrepreneurial cognition had a positive effect on knowledge search. This finding indicates that the entrepreneurial cognitive style can improve TMT's cognitive ability and cognitive demand, direct exploratory and exploitative knowledge search at the organizational level, and encourage the integration and development of new knowledge through the acquisition of various knowledge elements.

Third, our results show that knowledge search had a positive effect on DBMI. This finding indicates that new knowledge and diverse information resources are essential for business model innovation activities, and dual business model innovation requires both exploratory and exploitative knowledge, which is consistent with previous literature related to knowledge management and innovation management [55,56].

Fourth, our results suggest that knowledge search has a variety of mediating effects between various entrepreneurial cognitive elements and dual business model innovation. This finding indicates that knowledge search acts as a bridge linking TMT cognition style with DBMI, combining a fully mediating effect with a partial mediating effect between them. Thus, firms can benefit from both the direct and indirect influence of entrepreneurial cognition on DBMI.

## 6.2. Theoretical Implications

Our study makes three theoretical contributions. First of all, our study contributes to research on entrepreneurial cognition by broadening the research object and context. The existing literature has mainly focused on cognitive thinking of founders and entrepreneurs, maintaining that it is importance for enhancing organizational effectiveness under venture environments [23]. However, our research suggests that entrepreneurial cognition is not unique to entrepreneurs but is also necessary for TMTs. Meanwhile, the positive impact of such cognitive thinking is relevant not only in the start-up process, but also for mature companies to cope with external dynamics, such as sudden “black swan” events, which is consistent with Combe et al.'s argument on strategic flexible cognition theory [57]. It is implied that entrepreneurial cognition belongs to a highly flexible thinking model, enabling executive teams to diversify their interpretation of the problems they face, facilitating dynamic resource allocation to better grasp business opportunities.

Secondly, our study advances knowledge on the formation of business model innovation. The prior studies emphasized the differences between proactive and reactive business model innovations, while ignoring their synergy and balance [14,58]. Due to this, most research focuses on the factors influencing single business model innovation, but less is known about the factors influencing dual business model innovation. Our findings confirm that entrepreneurial perceptions of TMT can lead organizations to adopt dual business model innovation, which reveals to a new antecedent variable of business model innovation and is a useful addition and extension to upper echelon theory. In addition, our research implies that the real forces driving organizational business model change are not organizational restructuring, situational resource arrangements, or leadership styles, but rather the fixed cognitive patterns of decision makers.

Finally, our research deepens the understanding of the evolutionary mechanism of business model innovation. Present findings consider the evolution of business model innovation is the outcome of passive adaptation to the environment and continuous trial-and-error improvement [58,59]. However, our research reveals two knowledge searching processes and demonstrates that business model innovation entails not only cognitive

sculpting of the external environment by managers, but also a process of maximizing and restructuring complex resources. Moreover, the mediating effect of knowledge search points out that entrepreneurial cognition has an extremely high cognitive capacity to evoke dual information processing, which is particularly significant for explaining the variation of information processing styles in decision-making systems among individuals [60,61].

### 6.3. Practical Implications

Many managers think that it is difficult to coordinate the multiple aims of business models owing to limited resources. Our research, on the other hand, reveals that duality in business model innovation is achievable, and that the key is TMT. As a result, all firms should emphasize TMT development. When hiring top managers, for example, organizational leaders should pay close attention to their thinking style and make it an essential factor for evaluation. Simultaneously, enterprises should boost specific training to develop TMT's configuration cognition, willingness cognition, and ability cognition, as well as overcome the inertia of individual fixed thinking and raise sensitivity to situational cognition. Furthermore, the mediating role of knowledge search implies that business model innovation has typical information feature, with varied innovative information and resources providing nutrients for business opportunity identification and development. Accordingly, organizations should adopt more knowledge management activities, such as designing a balanced knowledge management strategy [62], increasing investment in information technology [63], and constructing a more intelligent knowledge-based system in the relevant field [64].

### 6.4. Shortcomings and Prospects

Due to time and capacity constraints, this study inevitably has some limitations. First, the sample data are self-reported data from high-level decision makers, and although the homogeneity error is not significant, there may still be some effects. Future studies can collect multi-source data to verify the findings of this paper. Second, the model empirically uses cross-sectional data, while there may be a dynamic process of the influence of entrepreneurs' cognition on business model innovation. A longitudinal research design can be used in the future to further test the relevant findings. Third, this study explains the relationship between entrepreneurial cognition and dual business model innovation in terms of knowledge search; however, there may be other ways or mechanisms through which the cognitive patterns of TMT may influence business model decisions. In the future, the relationship can be explored more extensively from multiple perspectives, such as organizational structure and network characteristics. Fourth, the differences in organizational inertia, knowledge absorption, and learning ability of different enterprises can be considered in the future to add corresponding moderating effects and improve the conceptual model.

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**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study. Written informed consent has been obtained from the patient(s) to publish this paper.

**Data Availability Statement:** The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

**Conflicts of Interest:** The authors declare no conflict of interest.

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